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## Integrating marine policy into the national development strategies of Jamaica

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INTEGRATING MARINE POLICY INTO  
THE NATIONAL DEVELOPMENT  
STRATEGIES OF JAMAICA

by

Novellette M. McFarquhar

Jamaica

A paper submitted to the Faculty of the World  
Maritime University in partial satisfaction of the  
requirements for the award of a

MASTER OF SCIENCE DEGREE

IN

GENERAL MARITIME ADMINISTRATION

The contents of this paper reflects my personal views  
and are not necessarily endorsed by the University.

Signature: *N. McFarquhar*

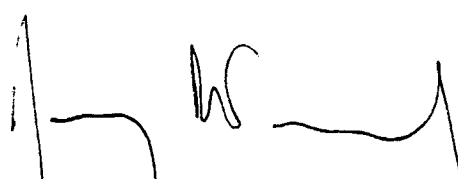
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## PREFACE

The deterioration and degradation of coastal resources and marine environment is a very serious problem in a number of developed and developing countries.

Technological advancements and economic developments are moving in directions which are rapidly reducing existing natural resources and destroying the very base on which development depends.

These problems have attracted worldwide attention and positive steps have been taken by International Organisations such as the International Maritime Organisation, (IMO) United Nations (UN), Food and Agricultural Organisation (FAO), and United Nations Environmental Programme (UNEP) to develop programmes to assist countries in addressing these problems. International funding agencies such as The World Bank, The International Monetary Fund (IMF), and United Nations Development Programme among others are also actively involved in the development and implementation of programmes to help countries solve the environmental problems and thereafter to exploit their resources within the limits of sustainable development.

The concept of sustainable development is now being promoted not only by these International Institutions but also by Regional Agencies and Groups.

This concept must be integrated into the national planning process of countries, if the resources are to continue benefiting present generations and be available to meet the needs of the future generations.

The United Nations in its attempt to promote sustainable development has adopted a resolution concerning the principle of sustainable development. The resolution made this principle a part of their policy for the next decade. Due to this resolution, an independent body was set up by the UN. This body, The World Commission on Environment and Development headed by Gro Harlem Brundtland, Prime Minister of Norway was empowered to;

" examine the critical environment and development problems of the planet and to formulate realistic proposals to solve them and to ensure that human progress will be sustained through development without bankrupting the resources of the future generation "1

In the completed report, the Commission showed that the environment and development are intricately linked, and that environmental degradation can result in undermining economic development.

The Commission recommended that all countries should start looking at their environment particularly with respect to their resource base, and life support system and to sustainable development for the future.

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<sup>1</sup> Our Common Future. The World Commission on Environment and Development. Oxford University Press, April 1987.

If Jamaica is to continue depending on its natural resources, it will have to take steps to implement the recommendations of the Commission. In addition, with the right to extend national boundaries in accordance with the United Nations Law of the Sea Convention, Jamaica will gain additional resources and therefore additional responsibilities.

The aim of this paper is to develop a framework for the establishment of an integrated national marine policy which should be incorporated into the country's national development plan. Policy and programme recommendations will also be provided.

Since the commencement of this study, significant changes have occurred in Jamaica with respect to environmental management. Positive steps have now been taken by the Government that was elected to office in February 1989 to develop a co-ordinated approach to environmental management. This has resulted in the establishment of the Ministry of Development, Planning and Production. Bills are also being reviewed for the consolidation and updating of environmental legislations and for the re-organisation of the Natural Resources Conservation Authority as a Statutory body.

## ACKNOWLEDGEMENTS

The completion of this thesis would not have been possible without the valuable assistance and contribution from friends, visiting professors and from members of my organisation.

I would first like to express my appreciation to the Swedish Agency for Technical and Economic Co-operation (Beredningen for Internationellt Tekniskt - ekonomiske Samarbete (BITS) for providing me with a fellowship to attend the World Maritime University.

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N. McFarquhar

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## ACRONYMS

BCA	Beach Control Authority
CAP	Caribbean Action Plan
CIDA	Canadian International Development Agency
ECD	Environmental Control Division
EEZ.	Exclusive Economic Zone
EIA	Environmental Impact Assessment
FAO	Food and Agricultural Organisation
GDP	Gross Domestic Product
GNP	Gross National Product
ICOD	International Center for Ocean Development
IDB	International Development Bank
IMF	International Monetary Fund
IMO	International Maritime Organisation
JCDT	Jamaica Conservation and Development Trust
JIDC	Jamaica Industrial Development Corporation
JJN	Jamaica Junior Naturalists
JNHT	Jamaica National Heritage Trust
JPS	Jamaica Public Service
JTB	Jamaica Tourist Board
MQD	Mines and Quarries Division
NACOLADS	National Council on Libraries, Archives and Documentation Services
NRCA	Natural Resource and Conservation Authority
NGO	Non-governmental Organisation
NHSJ	Natural History Society of Jamaica
NRCD	Natural Resources Conservation Division
OAS	Organisation of American States
ODP	Office of Disaster Preparedness

PAJ	Port Authority of Jamaica
PCJ	Petroleum Corporation of Jamaica
PIOJ	Planning Insititute of Jamaica
SRC	Scientific Research Council
TPD	Town Planning Department
UDC	Urban Development Corporation
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UWA	Underground Water Authority
UWI	University of the West Indies (Mona)

## INTRODUCTION

As it moves into the 1990's Jamaica is faced with economic as well as environmental problems. Faced with a large foreign debt of US 4.5 bil. dollars and low levels of production in some sectors, the government is embarking on a path to increase production in certain sectors and also to create a climate for foreign and domestic investment to increase its foreign exchange earnings.

The objective to increase foreign exchange earnings will no doubt result in the increasing concentration of industrial and commercial activities in and within close proximity to the coastal areas. The exploitation of the natural resources will also intensify.

However, if Jamaica's economic development is to be sustained, it is essential that new strategies are devised that will promote the type of growth that will incorporate long-term conservation objectives and promote the prudent use of natural resources.

With a coastline of approximately 900 km and with an already high concentration of industries and population on the coastal areas the development of a national integrated marine policy to; regulate activities within the coastal area, manage and protect the coastal and marine resources and to protect the marine environment is essential. Without such a policy, all future economic development plan will be short-lived.

This new policy should be integrated into the broader national economic plan of the country.



The establishment of an Exclusive Economic Zone will also have a profound impact on ocean management in Jamaica. The establishment of such a zone will not only create potential benefits but will also bring about new management responsibilities. In addition, conflicts in use of living resources and coastal areas are bound to increase.

The traditional sectorial approach to coastal area development and resources management is inadequate to deal with the future given the changes that are occurring.

With the potential increase in economic activities in the coastal zone, and the potential benefits to be gained from the establishment of an EEZ, a new form of coastal and sea use planning is required to :

1. to integrate existing uses of the ocean with new uses;
2. to minimise and to prevent conflicts among interested users of the coastal area, the coastal and marine resources and to allow the exploitation of resources to proceed in a harmonised manner;
3. to achieve sustainable development of coastal and marine resources;
4. to protect and conserve the living resources of the marine environment; and
5. to protect the marine environment.

The objective of this thesis is therefore to establish a coherent and comprehensive marine policy to; cover the exploitation of coastal and marine resources within sustainable limits, protect the coastal areas and the marine environment and to regulate the development of the

marine sector and marine related activities. The thesis will focus on the marine sector's economic importance and its problems, activities affecting the coastal areas and the marine environment and the implication of the United Nations Convention on the Law of the Sea.

The study will also analyse the legislative and administrative mechanism covering coastal and marine resource development with a view to establishing policy recommendations for an integrated national marine policy.

The thesis is composed of 9 chapters. Chapter 1 gives a brief overview of Jamaica. Chapter 2 outlines the importance of the marine sector to the Jamaican economy. This is necessary for the identification of priority areas for development within the marine sector. Chapter 3 deals with issues and problems relating to the marine sector. This is also a pre-requisite for identifying areas that need special attention. Chapter 4 focuses on the marine environment, the coastal ecosystem, the major marine environmental problems, marine pollution and the factors and activities contributing to the pollution of the marine environment. Chapter 5 outlines the implication of the Law of the Sea to Jamaica. Chapter 6 outlines the methodological framework for the establishment of an integrated national marine policy. It focuses on the requirements, formulation and implementation of an integrated national marine policy. The role of an integrated national marine policy in national development is briefly outlined in this chapter. The following chapter, addresses marine policy in Jamaica. It traces the historical development of environmental management in Jamaica. It identifies marine policy in Jamaica in terms of its legisla-

tion, institutional infrastructure, the international and regional conventions ratified.

Chapter 8 briefly outlines elements such as environmental impact assessment, project evaluation, public awareness, education and training and international assistance which are all important for the successful implementation of the integrated marine policy.

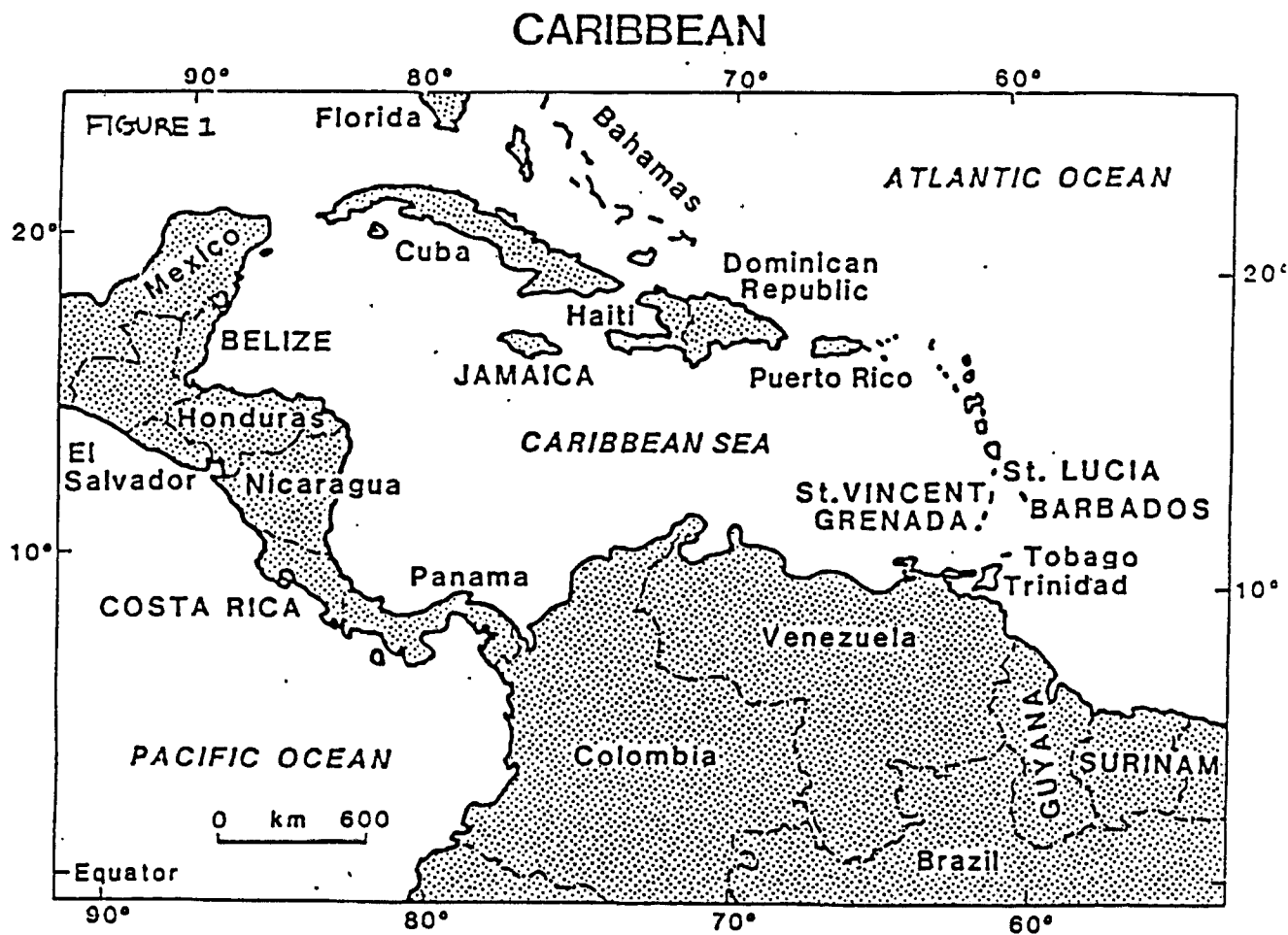
Chapters 1 -8 lay the foundation for chapter 9 which deals with policy and programme recommendations identifies policies and projects/programmes for sound management and development of marine and coastal resources within the limits of sustainable development. Recommendations are also provided in terms of the institutional infrastructure for integrated management of the coastal area and coastal resources.

# CHAPTER 1

## BACKGROUND TO JAMAICA

### 1.1 Location

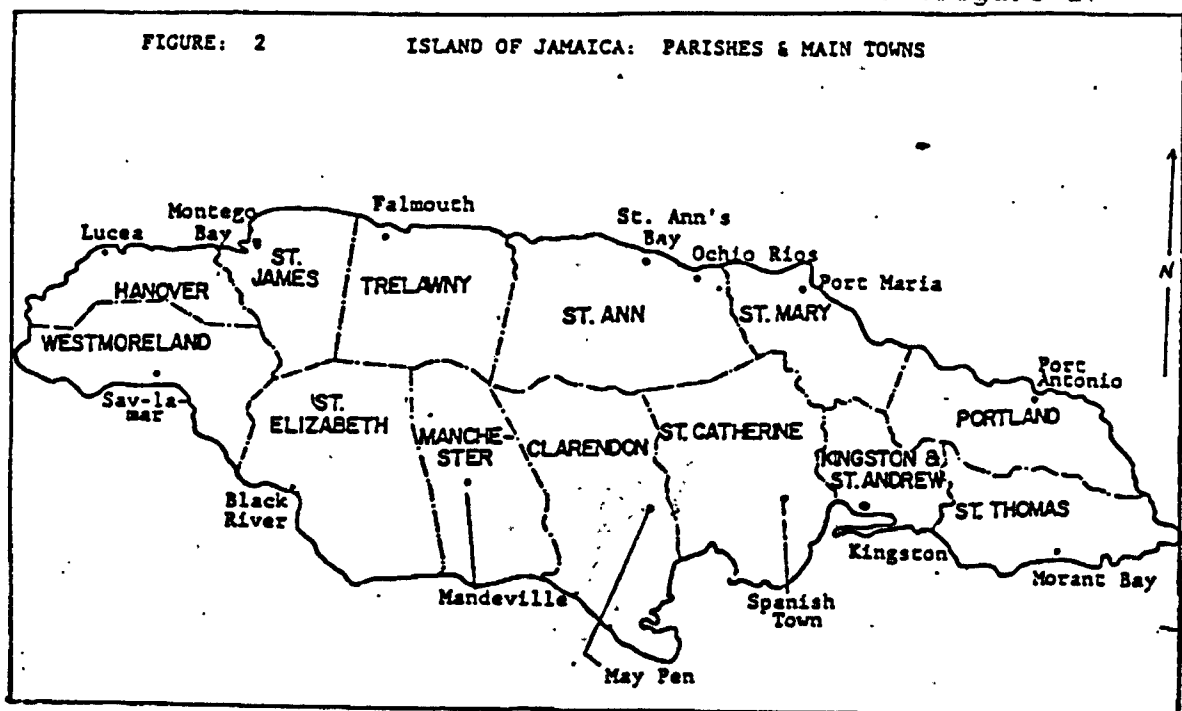
Jamaica, the third largest island in the Caribbean, is located in the Greater Antilles approximately 90 miles (145 km) south of Cuba and 100 miles (161 km) west of Haiti. (figure 1)



## 1.2 Population and Size

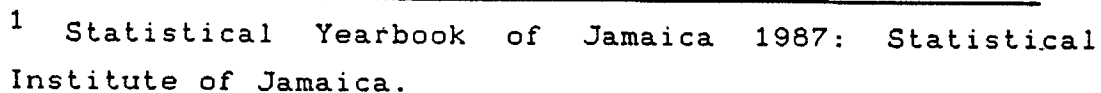
The island has a population of approximately 2.3 million and an area of 4,411 square miles (10,939 sq. km). It lies between latitude 17 degrees 43 mins. and 18 degrees 32 mins. N and longitude 76 degrees 21 mins. W. It is 146 miles (236 km) long by 51 miles (82 km) at it's widest point.

The island is divided into three Counties - Surrey in the East, Middlesex in the center, Cornwall in the West and these are further sub-divided into fourteen parishes. Each parish has a capital town, which is the center of local government administration. Kingston, situated next to the harbour of Port Royal in the southern west end of the island, is the capital city. Montego Bay, the other city, is located on the island's northwestern coast and is the leading tourist resort. Other important towns include Spanish Town, the former capital; Mandeville in the heart of the bauxite mining area; May Pen and the tourist centers of Ocho Rios and Port Antonio. (figure 2)



The island of Jamaica comprises three main physiographic regions; (1) the interior mountain ranges (2) the dissected and karst limestone plateau and hills and (3) the coastal plains.

Located in the center is the Cockpit Country, which is of limestone origin and it is the center of the bauxite aluminium industry which was Jamaica's major foreign exchange earner until 1982.<sup>1</sup> (figure 3)



The topography of these mountainous areas is rugged, picturesque, dis-sected by deep erosional valleys and gullies with steep hillsides being subjected to strong soil erosion and landslides where deforested.

St. Thomas Ye Vale, the Queen of Spain Valley and the Nassau Valley are the three main interior valleys of the island. (see figure 3)

The coastal plain is less than two miles (3.2 km) wide along most of the north coast and areas of the south coast. The plain widens in some areas to form embayments, the most extensive of which are located at the eastern and western end of the island, and the Clarendon and St Catherine Plains. There are two partially enclosed embayments formed by the Queen of Spain Valley in the North and the Horse Savannah in the south.

The prime agricultural lands of the island are located in the interior valleys and on the coastal plains. Some of the coastal lands, however, are swampy with the two major swamp areas being the Upper Morass and the Great Morass located in the southwest, and the Westmoreland Plain north of Savanna -la-mar and the Great Morass, both on the Western end of the island. (see figure 18)

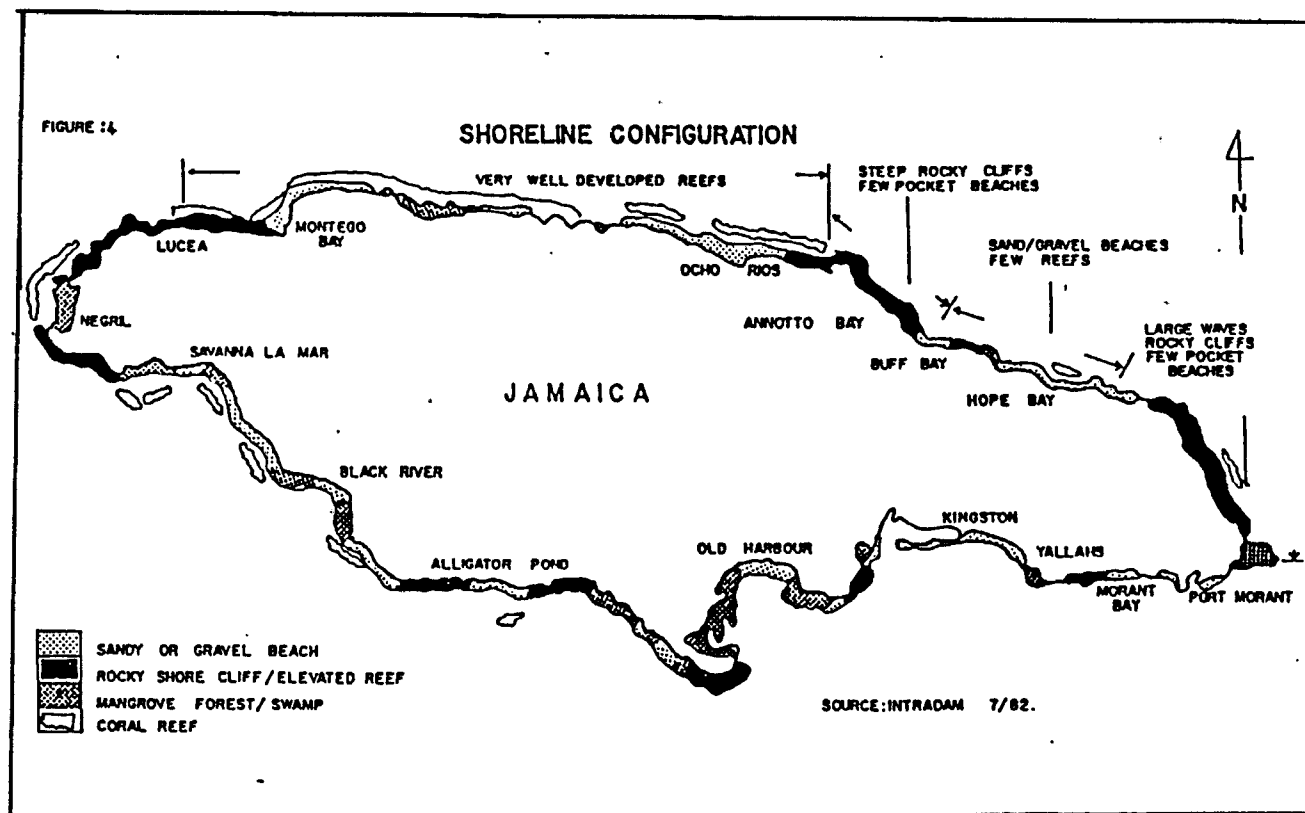
Due to the ruggedness of the interior highlands, most of the major developments of the island have occurred along or in close proximity to the coast.

Jamaica has a coastline of approximately 553.79 miles (990 km) long. The amount of usable shoreline is 45.5% of the entire coastline.<sup>2</sup>

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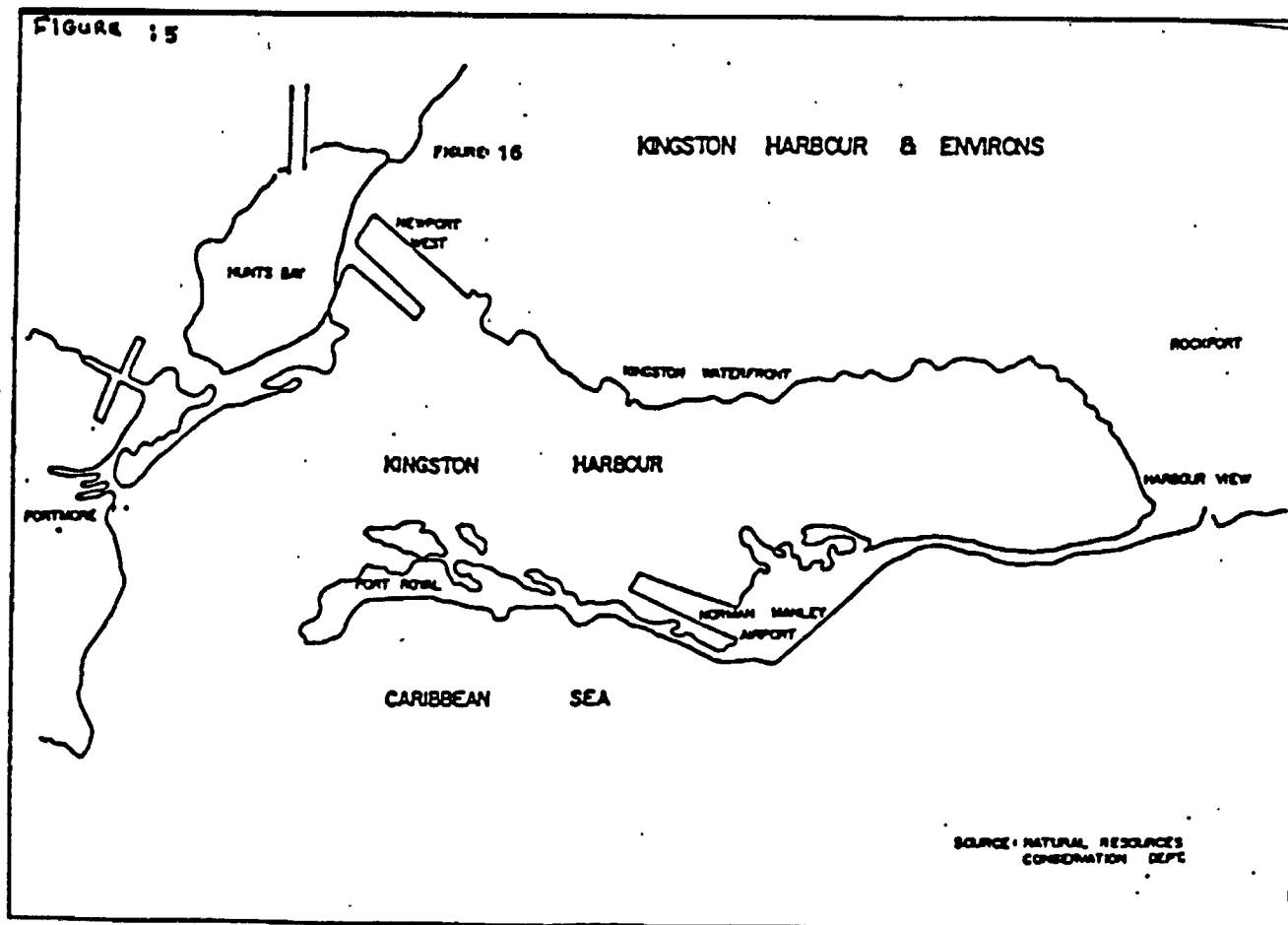
<sup>2</sup> supra n. 1.

The coastline is characterised by irregular features indented with bays and extended by sand pits and bars. This varied and irregular coastline creates unique eco-systems formed by the integration of coastal features that include harbours, bays, beaches, rocky shores, estuaries, mangroves, cays and coral reefs. (figure 4)





The largest and most protected port in the Caribbean is the Kingston Harbour, which is sheltered by the eight mile long Palisados sand pit, with 8 sq miles of navigable waters. (figure 5)



The south shoreline is bordered by long straight cliffs, mangroves, swamps and black sand beaches. There are only a few barrier reefs and numerous sand cays along the south coast. (see figure 4) The two largest cays off the south coast are the Morant and Pedro Cays.

The north coast is characterised by rugged edges, calm seas and white sand beaches (the finest of which stretches for a few miles along the west coast of Negril) and fringing coral reefs, which extend almost continuously along the edge of the shelf from Negril to Morant Point. (see figure 4) The north coast has no shallow marine flat shelves, but the sea bottom plunges steeply to great depths. The sea and beaches are backed by a flat raised plateau and uplifted coral reefs.

The coastline is also characterised by a number of salt water lagoons, such as the Yallahs Pond in St Thomas and the Great Salt Lake in St Catherine. Other major enclosed water bodies that occur in coastal areas are largely of fresh water and include such sites as the Mystery Lake and Green Grotto in St Ann and the Wallywash Pond in St. Elizabeth. The coastal area of the island has been delineated into two boundaries - the Inland Boundary and the Seaward Boundary. (figure 6)

The Inland Boundary is marked by a 100 ft contour, which encompasses the major wetlands of the island, rocky shore areas and the coastal plains. The Seaward Boundary is marked by the furthest extension of the island's shelf. This boundary also covers Jamaica's 12 mile territorial waters as well as its numerous Cays, the most important of which are the Morant Cays and the Pedro Cays. which are located off the south coast. (figure 7)

FIGURE 6

COASTAL AREA BOUNDARIES AND MANAGEMENT UNITS

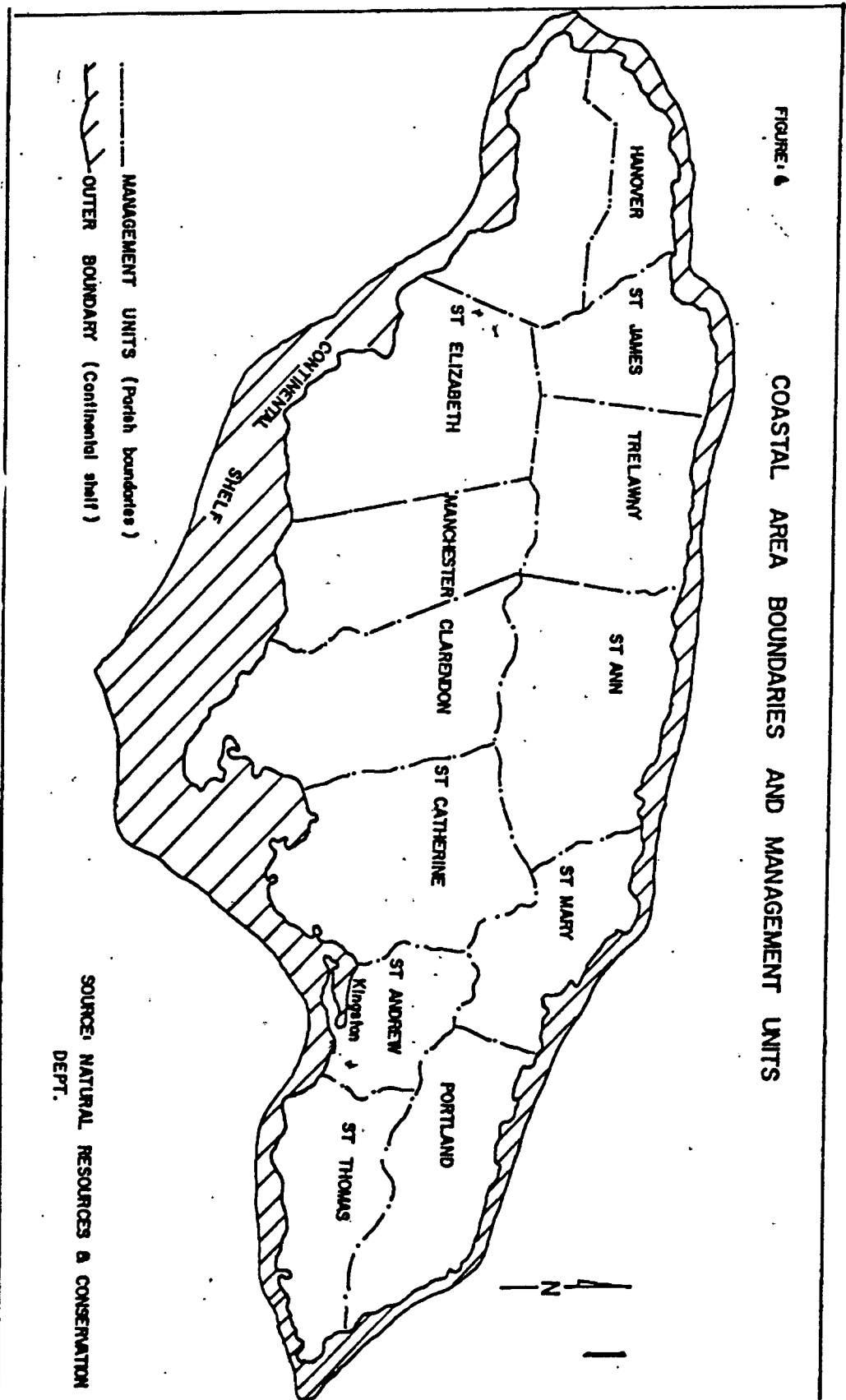
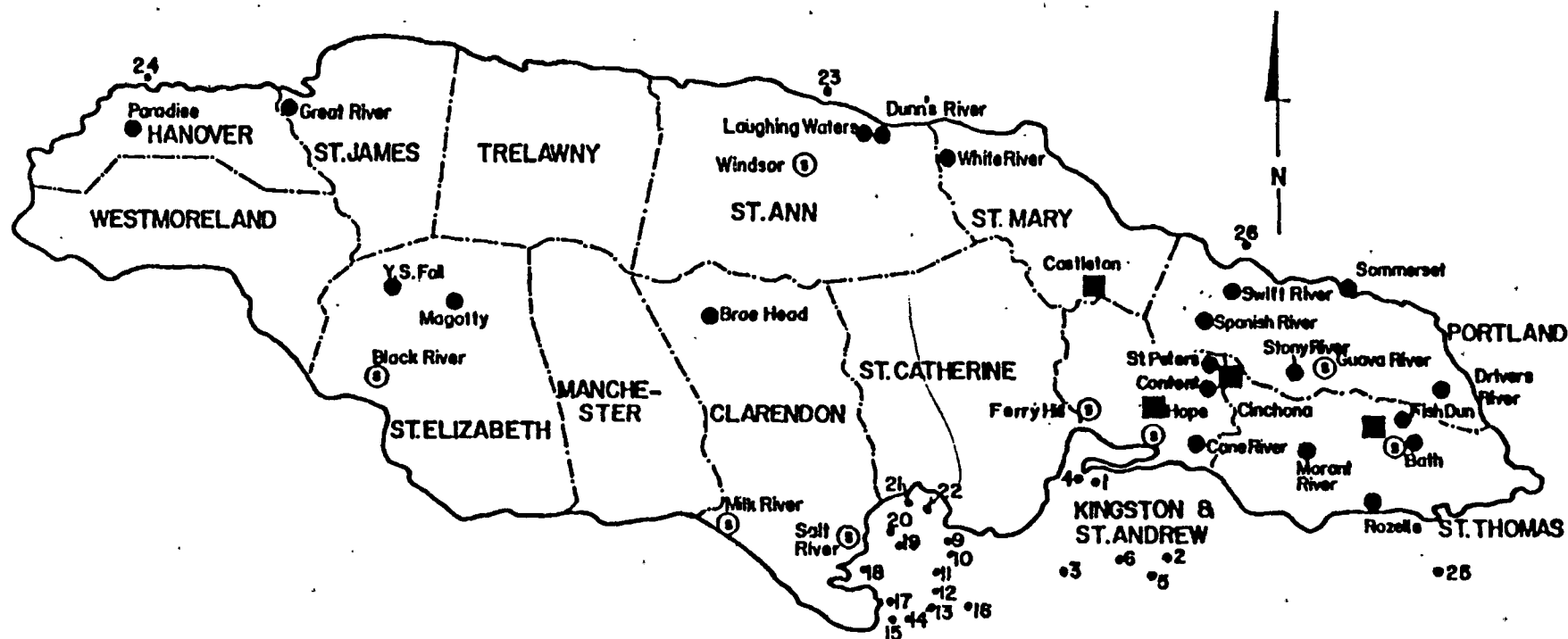


FIGURE: 7

# JAMAICA : OFFSHORE ISLANDS AND CAYS,



17 LOCATIONS OF ISLANDS AND CAYS

SOURCE: ADAPTED FROM TABLES IN N.R.C.D., C.E.P.  
RECONNAISSANCE REPORT.

Note: Three Islands/Cays cannot be  
located even though mentioned  
in text.

27  
Pedro Cays

No	ISLAND OR CAY	No	ISLAND OR CAY	No	ISLAND OR CAY
1	Lime Cay	11	Pigeon Island	19	Long Island
2	South East Cay	12	Little Half Moon Cay	20	Short Island
3	Drunkenman Cay	13	Big Half Moon Cay	21	Carreening Island
4	Rockhams Cay	14	Little Portland Cay	22	Great Goat Island
5	South Cay	15	Big Portland Cay	23	Love Island
6	Malden Cay	16	Bare Bush Cay	24	Green Island
9	Big Pelican Cay	17	Dolphin Island	25	Morant Cays
10	Little Pelican Cay	18	Salt Island	26	Navy Island

Also located off the south coast are groups of small sandy islands, some of which are used for recreational purposes both by the inhabitants and tourists. (see figure 7)

The natural features of the coastal areas mentioned above provide a coastal resource base that contribute to the economic well being of the island.

Tourism, which has remained the fastest growing sector in the island and the most consistent earner of foreign exchange, depends on the beauty and cleanness of the island's beaches and coastal waters.

In addition, most of the industrial development occurring in the island has been established along or near the coastal areas.

#### **1.4 Climatology**

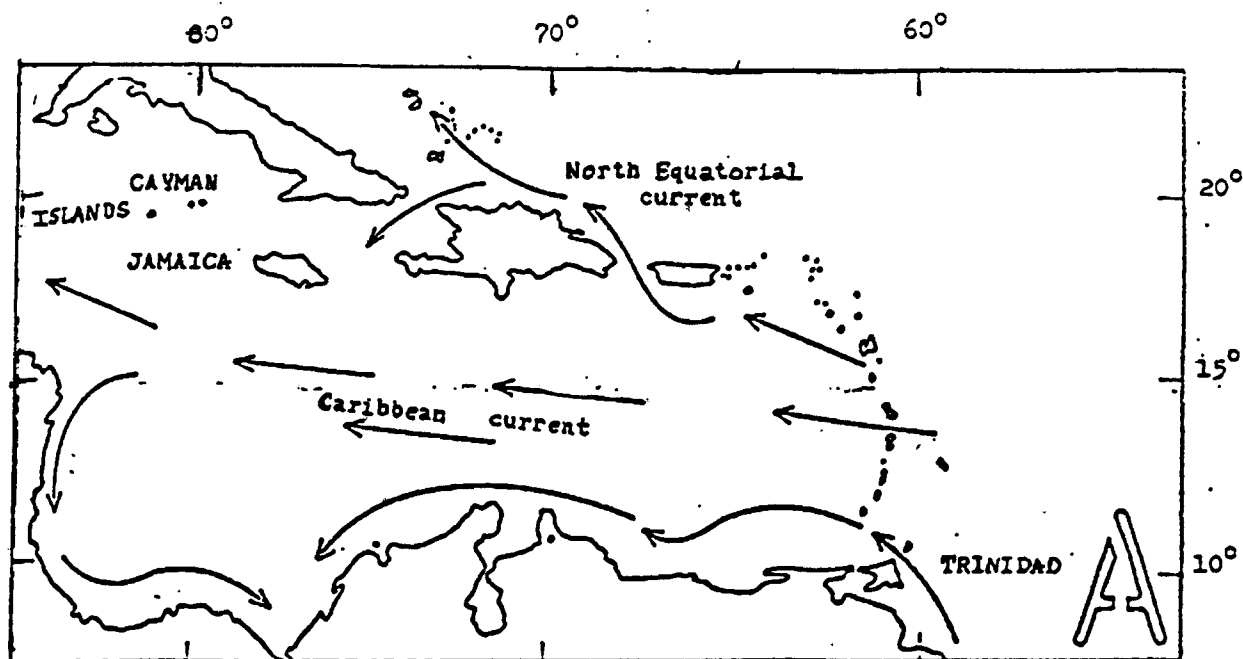
Jamaica has a tropical marine climate which is modified by the trade winds and land and sea breezes. The island has an average rainfall of 77 inches annually falling mainly in May and October. The dry season, which is also the coolest, lasts from December to March. The average temperature along the coast is 80-90 F. Most coastal areas receive less than 80 rainy days per year.

#### **1.5 Oceanography**

Jamaica is washed by the North Equatorial Currents which pass through the Windward Passage and partly by the

Caribbean Currents which originate in the Eastern Caribbean and flow westerly around the island.<sup>3</sup> (figure 8)

Figure 8 Flow of Currents Around Jamaica



Source The Distribution, Abundance and Development of Young Jamaican Reef Fisheries!.Scientific Report of the UWI ODA Fisheries Ecology Research Paper 1974 - 1979

<sup>3</sup> The Distribution, Abundance and Development of Young Jamaican Reef Fisheries: Scientific Report of the UWI ODA Fisheries Ecology Research Paper 1974-1979.

Currents are very important to the country because they can affect the reproductive biology of fish, in that, pelagic eggs and larvae are subject to wind and currents which may carry them to environments unsuitable for their development.<sup>4</sup> The earliest larval and young fry stages are the most important<sup>5</sup> as they have significant bearing on the future available stock. In addition, oil pollution can be spread by currents from one area to another affecting the coastal resources as well as the coastal areas such as the beach, which is one of the main tourist attractions. Consequently, understanding of the current patterns is essential in the implementation of marine resources management.

## 1.6 Natural Hazards

### Hurricanes and Earthquakes

Jamaica is vulnerable to two main natural disasters; earthquakes and hurricanes. These natural disasters can have significant effects on the coastal areas. Earthquakes and hurricanes have, in the past resulted in landslides and flooding respectively. Most of the coastal areas of Jamaica are major risk areas vulnerable to flooding, storm surges and earthquakes. (figure 9)

#### 1.6.1 Hurricanes

Considerable threats from hurricanes are experienced in the island during the hurricane season which extends from July to November.

The coastal areas of the island are most vulnerable to flooding caused by hurricane induced storm surges.

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<sup>4</sup> supra n. 3

<sup>5</sup> ibid

PRELIMINARY MAP OF HIGH RISK AREAS - JAMAICA

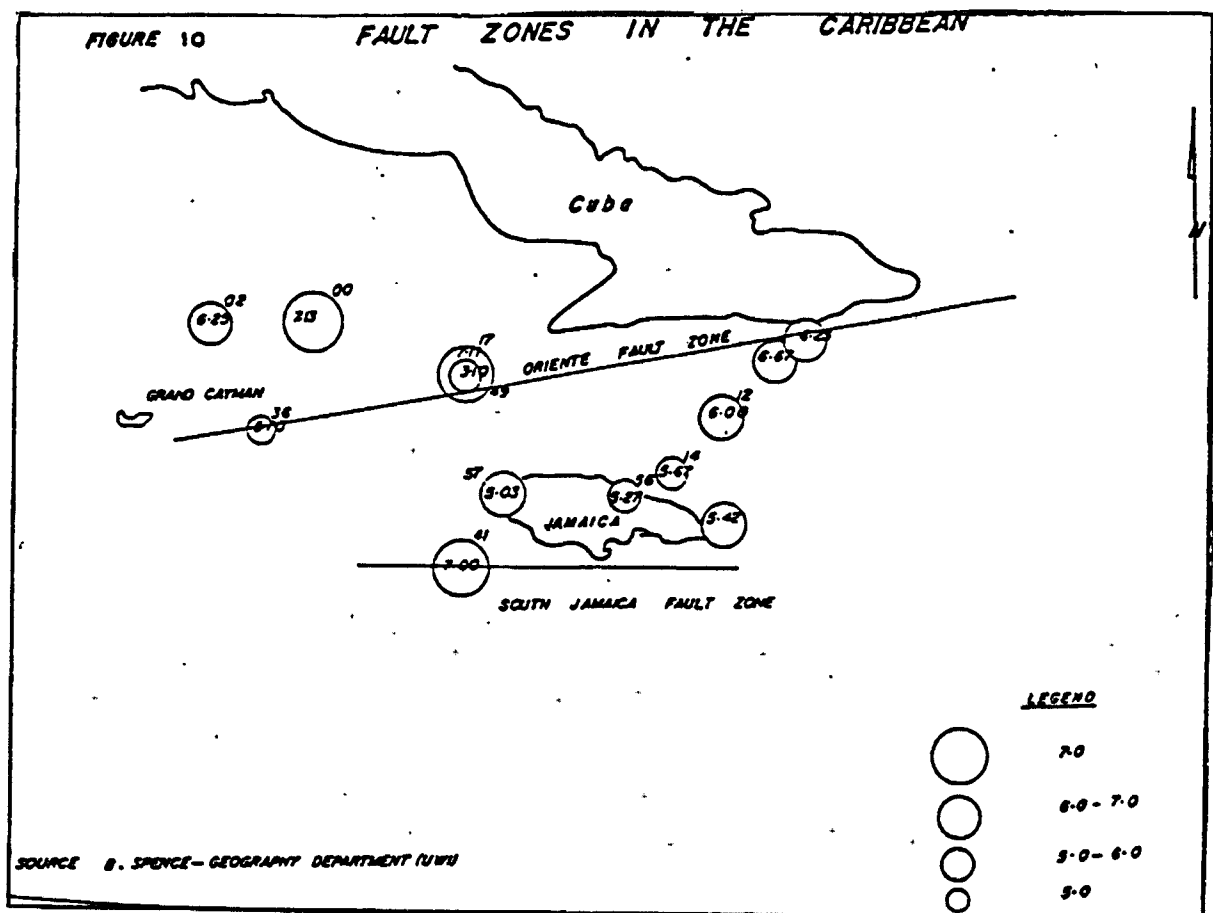




The Kingston Harbour, which is densely populated and which has a high concentration of economic and industrial activities, is vulnerable to coastal flooding.

### 1.6.2 Earthquakes

Situated only 90 miles south of the Cayman Fault which forms the boundary between the Caribbean and the North American Plates, Jamaica lies within one of the world's seismic risk areas. (figure 10) Because of this location, the island has experienced a number of earthquakes over the years. The most recent earthquakes were experienced directly after hurricane Gilbert in September 1988. The two largest earthquakes to impact Jamaica in historic times are those of the 1692 (the Port Royal Event) and the 1907 (the Kingston Event)



The Kingston Metropolitan Area which is built on unconsolidated alluvial sands and gravels (the Liguanea Plains) and which has the highest population density of the island is more susceptible to tremors than other areas of the island. Low intensity earthquakes also occur along the north coast where most of the tourist resorts are located.

### 1.7 Government

Jamaica is a member of the British Commonwealth of Nations. The form of government is constitutional monarchy in which the Queen is the titular sovereign and is represented on the island by the Governor General. The Constitution provides for a democratic form of government with a House of Representatives elected every five years in a general election held under Universal Adult Suffrage. The government is headed by a Prime Minister. The Cabinet is the principal instrument of Government policy.

### 1.8 The Economy

Historically, the Jamaican economy has had an agricultural base, dependent on a few staple export crops, notably sugar and bananas. New economic development began with bauxite mining after 1952 and the tourism boom in the 1950s and 1960s. This resulted in the rapid expansion of the construction industry and manufacturing, which, in 1959, surpassed the contribution of agriculture to the Gross Domestic Product (GDP).

In the mid-1970s, international recession revealed the structural weaknesses of an economic system dependent on the international commodities markets. This, together with domestic socio-economic problems, adversely affected agriculture, manufacturing and tourism. The result was

reduced foreign exchange earnings and investment activities.

The 1980s have seen the continued growth in tourism. By 1986 tourism had become the nation's largest industry and contributed 512 US million dollars to the economy.<sup>6</sup> Divestment of government-owned companies also began in the mid-1980s. With the stabilization of the international commodities markets that also took place during this time, the Jamaican economy has seen renewed growth in the eighties.

## 1.9 Industries and Natural Resources

### 1.9.1 Agriculture

Approximately 1.5 million acres (about 55 percent) of Jamaican land is utilized for agriculture. The agricultural sector is singularly the largest source of employment accounting for 36 percent of the labour force.

Sugar cane and bananas are the most important export crops, occupying 21 percent of all agricultural lands. Other traditional export crops are coffee, cocoa, citrus, tobacco, and to a lesser extent, a variety of spices such as ginger and pimento.

The non-traditional export crops include vegetables, fruits, tubers and horticulture.

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<sup>6</sup> Economic and Social Survey Jamaica 1986: Planning Institute of Jamaica

Domestic crops, which include yams, sweet potatoes, maize, pumpkins, peas, beans and other vegetables, are grown mostly on small farms well below five acres in size. Tree crops, such as mangoes, avocados and ackee, are also planted by small farmers. Livestock, products such as meat, milk and eggs, are also produced. Fish and seafood are important sources of protein supply.

### **1.9.2 Mining**

Bauxite and gypsum are the main minerals mined in the country. The local bauxite industry dates back to 1952, when Reynolds Jamaica Mines Ltd. wholly-owned subsidiary of the American owned Reynolds Metal Company of the United States, commenced the export of kiln-dried ore. This was soon followed, in 1953, by the export of aluminium by Alumina Jamaica Ltd, a subsidiary of the Aluminium Company of Canada.

Up to 1982, bauxite and alumina were the major source of foreign exchange. However, tourism is now the major source of foreign exchange. Other minerals mined in the island are limestone, silica sand, phosphate, marble, clay, peat, and, to a lesser extent, black sand containing titanium, copper, lead, zinc and phosphate.

### **1.9 3. Manufacturing**

Manufacturing, which started in earnest in the early 1950s with the enactment of incentive laws and the establishment of the Jamaica Industrial Development Corporation (JIDC), is now quite diversified. Jamaica manufactures a wide range of products, including food and drink, clothing, footwear, textiles, paints, building materials, agricultural machinery and toilet articles.

A large number of these industries are heavily dependent on imported raw materials, machinery and technology. In the interest of increasing employment and utilizing local raw materials, several organisations have been created to promote small business.

#### 1.9.4 Tourism

The Tourism sector is Jamaica's largest source of foreign exchange. This sector has been the fastest growing sector in the island since the early 1980's and the biggest and most consistent earner of foreign exchange. Contribution from this sector for the years 1987 and 1988 amounted to over 500 million US dollars.<sup>7</sup>

Jamaica's main tourist market is North America because of its close proximity and high per capita income. North America accounts for some 85 percent of stop over visitors.

There are many tourist areas along the North Coast. These include famous resorts such as Montego Bay, Runaway Bay, Ocho Rios and Port Antonio. (Figure 11) The Negril area of Westmoreland has also become an internationally popular tourist centre in recent years. (See Figure 11)

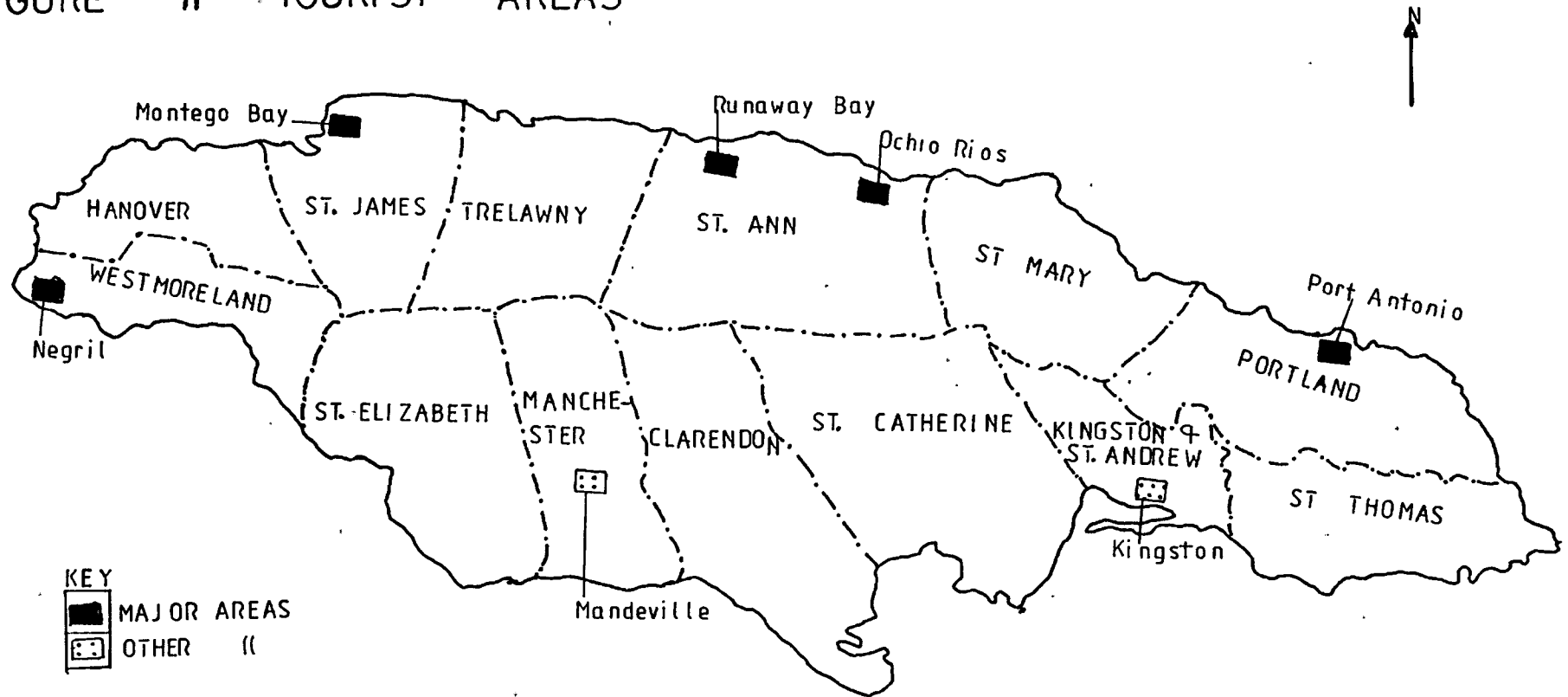
#### 1.9.5 Ports and Shipping

The two principal ports in Jamaica are Kingston and Montego Bay. The Bustamante Transhipment Port in Kingston services cargo en route to Caribbean and Latin American Countries.

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<sup>7</sup> Economic and Social Survey Jamaica 1988: Planning Institute of Jamaica.

FIGURE 11 TOURIST AREAS



Up to 1986 the Jamaica Merchant Marine Company Ltd, the national shipping line, was active and carried some of the countries bauxite, banana and grain. However plans have been made to divest the line.

#### 1.9.6 Summary

Jamaica is a relatively small island with a fragile ecosystem. Over the years, several factors have contributed to the deterioration and destruction of this ecosystem.

The marine and coastal waters and bordering land areas also support a number of very important economic sectorial activities such as industry, transportation, ports and shipping, tourism, fisheries and coastal communities. These activities are all important to the economic development of the island. However, they have contributed to the destruction and deterioration of the natural ecosystem and the marine and coastal resources.

The environmental problems will be outlined in chapter 5.

It is now accepted that the continued exploitation of coastal and marine resources and the development of the coastal areas require new planning and management strategies. These strategies should be geared towards the preservation, maintenance and prudent uses of the resources for the present and future generation. However, in order to develop the policy and management plan for the sustainable development of the natural resources, a review of all marine and coastal activities and factors affecting the marine environment is relevant. Accordingly, the proceeding chapters will cover areas such as the economic importance of the marine sector to the Jamaican economy,

the problems of the marine sector, marine environmental problems and issues, and maritime jurisdictional issues in connection with the United Nations Law of the Sea Convention.

This will be followed by other chapters outlining the framework for the development of an integrated national marine policy, which is the strategy recommended for the development and management of the coastal and marine resources. The final chapters will then deal with policy recommendations and the integration of marine policy into the national development strategies.

Chapter 2 will outline the economic importance of the marine sector to the Jamaican economy.



## CHAPTER 2

### THE ECONOMIC IMPORTANCE OF THE MARINE SECTOR IN JAMAICA

#### 2.1 Introduction

This chapter will give an outline of the important role that the marine sector plays in the economy. The marine sector in Jamaica plays a significant role in attaining some of the economic objectives of the island such as income and employment generation. With the establishment of the Exclusive Economic Zone (EEZ) this sector will have greater potential than before.

The marine sector of Jamaica consists of fisheries, and marine transport and tourism. Tourism is considered a marine related industry since its existence is dependent on the coastal areas, their resources and the marine environment.

The contribution of these industries to the island's GDP in 1987 is given in Table 1.

Table 1

#### Contribution of Fisheries and Tourism to Jamaica's GDP in 1987

Industries	J Mil	% of GDP
Fisheries	8.9	0.4%
Tourism	57.3 <sup>a</sup>	48%
Marine Transport	164.9	

---

<sup>a</sup>Based on estimates of contribution of hotels, restaurants and clubs to the total Miscellaneous Services.

Fisheries takes place virtually all along the coast. (see figure 12) On the other hand tourism development is found mainly along the North Coast (see figure 11 ). The two major ports are found in Kingston and in Montego Bay. (figure 13) The outports are located both on the north and the south coasts. (see figure 13)

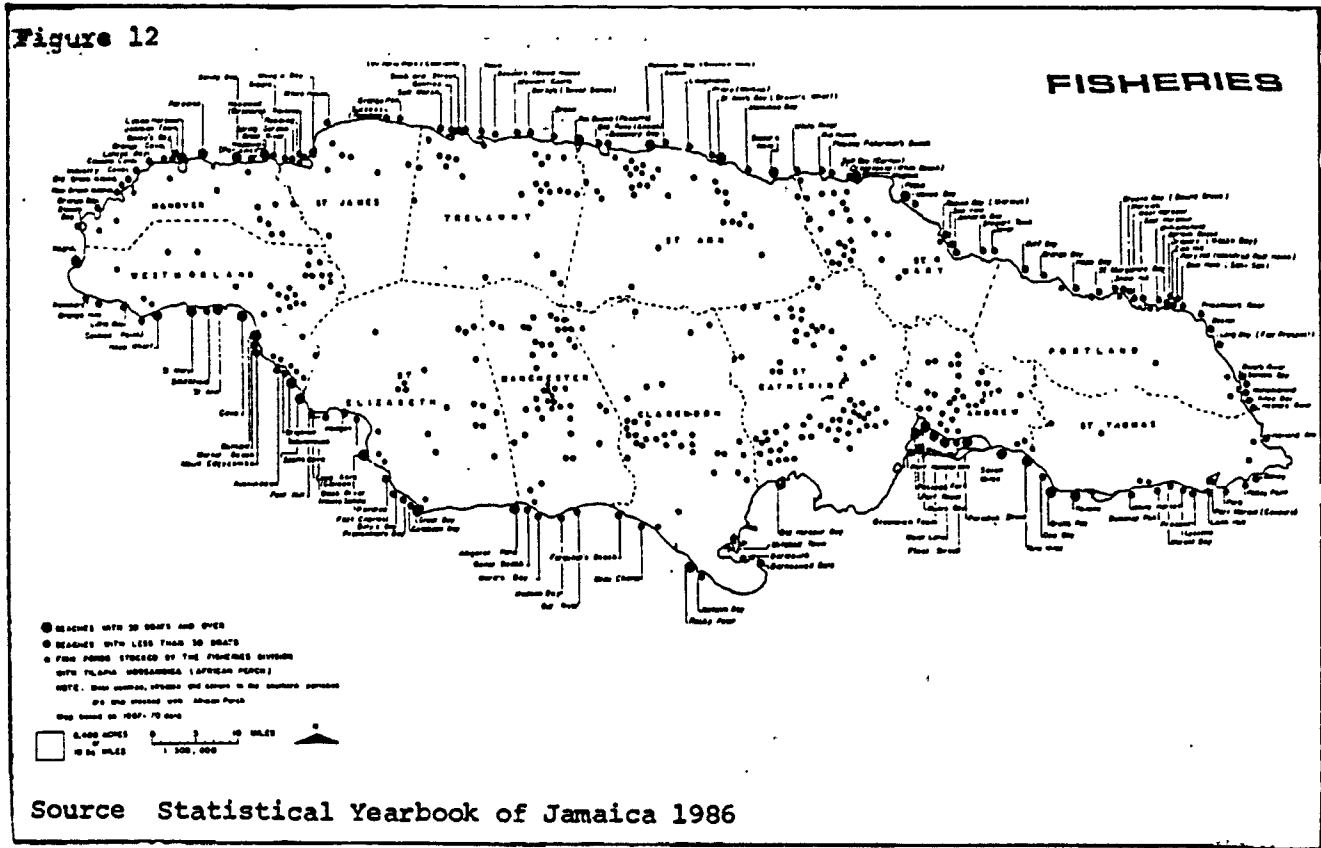
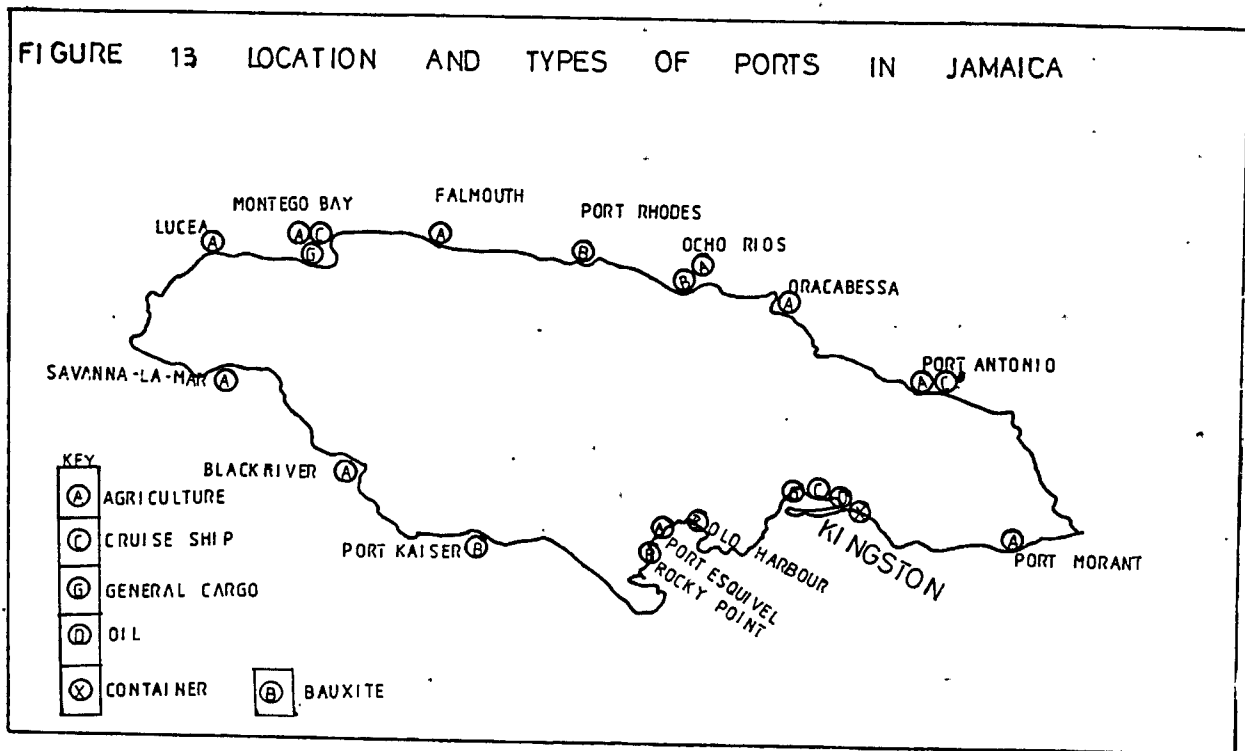
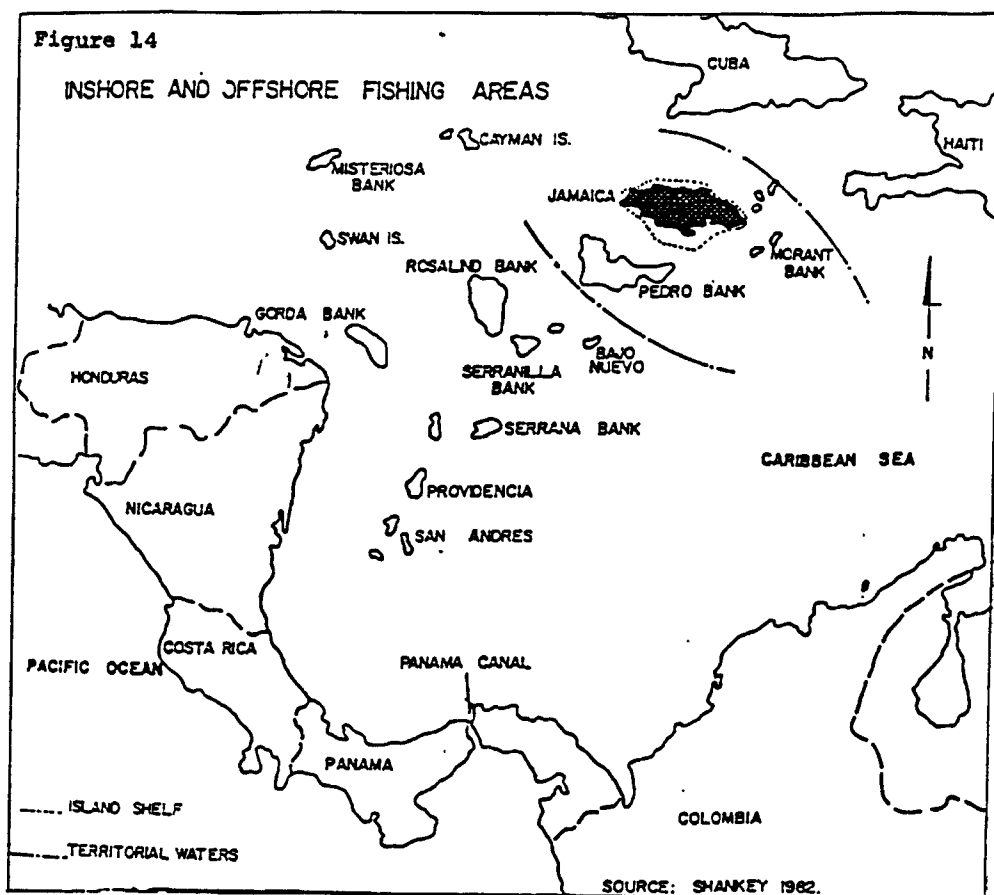


FIGURE 13 LOCATION AND TYPES OF PORTS IN JAMAICA



## 2.2 The Fishing Industry

Fisheries in Jamaica is mainly of two types, marine and freshwater. Marine fisheries is carried out in the inshore and offshore areas. (see figure 14 ) The inshore areas include operations which are carried out on the island's shelf and also in areas not exceeding 40 miles (64 km) from the mainland. The offshore fisheries occur in areas in excess of 40 miles from the mainland. These areas comprise operations in Jamaica's two largest fishing areas, The Morant and Pedro banks. Fishing operations are also conducted in the territorial waters of other nations such as Colombia, Honduras and Nicaragua. (figure 14)



Marine fisheries in the island is primarily artisanal in nature with 95% of the fishermen owning small boats, and operating in the island's coastal shelf and associated banks. (see figure 14)

The commercially harvested species include the demersal, (bottom dwelling) coral reef species including finfish and shell fish and pelagic (free swimming). The demersal fishery includes grouper, snapper, grunt, goatfish and parrot fish. The pelagic (free swimming) fishery comprises yellow fin tuna, blue marlin, dolphin and some species of whale. The coastal dwelling or inshore species include herring, anchovies, mullets and jacks. Other fishery resources of commercial value are shrimp, lobster and conch. Table 2 gives the fishery resources of Jamaica waters.

Table 2  
Fishery Resources of Jamaican Waters

**Oceanic Pelagic Fish Resources**

**CARANGIDAE:**

- Elagatis bipinnulatus* (Rainbow runner)
- Caranx ruber* (Bar jack)

**CARCHARHINIDAE:**

- Galeocerdo cuvieri* (Tiger shark)
- Carcharhinus leucas* (Reef shark)
- C. obscurus* (Dusky shark)
- C. maou* (Oceanic whitetip shark)

**CORYPHAENIDAE:**

- Coryphaena hippurus* (Dolphin fish)

**ISTIOPHORIDAE:**

- Makaira nigricans* (Blue marlin)
- Istiophorus albicans* (Atlantic sailfish)
- Tetrapterus albidus* (White marlin)

**SCOMBRIDAE:**

- Thunnus atlanticus* (Blackfin tuna)
- T. albacares* (Yellowfin tuna)
- T. alalunga* (Albacore)
- T. obesus* (Bigeye tuna)
- T. thynnus* (Bluefish tuna)
- Euthynnus alletteratus* (Little tuna)
- Katsuwonus pelamis* (Skipjack tuna)
- Scomberomorus regalis* (Cero mackerel)
- S. cavalla* (Kingfish)
- Acanthocybium solandri* (Wahoo)

**XIPHIDAE:**

- Xiphias gladius* (Swordfish)

**GINGLYMOSTOMATIDAE:**

- Ginglymostoma cirratum* (Nurse shark)

**ALEPISAUROIDAE:**

- Alepisaurus ferox*\* (Longsnout lancetfish)

**GEMPLYIDAE:**

- Gempylus serpens*\* (Snake mackerel)

\* These species are rare deepwater fish of no commercial value locally.

**Coastal Pelagic Fishery Resources**

**CLUPEIDAE:**

- Opisthonema oglinum* (Atlantic thread herring)
- Sardinella braziliensis* (Brazilian sardinella)
- Harengula jaguana* (Scaled sardine)
- H. homeralis* (Red-ear sardine)
- H. clupei* (False pilchard)
- Sardinella aurita* (Round sardinella)
- Jenkinsia lamprotaenia* (Dwarf herring)
- Chirocentron bleekeri* (Dogtooth herring)

**ENGRAULIDAE:**

- Anchoa lyolepis* (Dusky anchovy)
- A. hepsetus* (Striped anchovy)
- Ctenogaulis edulentus* (Atlantic anchoveta)

**MUGILIDAE:**

- Mugil cephalus* (Striped mullet)
- M. curema* (White mullet)
- M. liza* (Liza)

**CARANGIDAE:**

- Caranx ruber* (Bar jack)
- C. caryos* (Blue runner)
- C. latus* (Horse-eye jack)
- Selar crumenophthalmus* (Bigeye/Goggleeye scad)
- Decapterus punctatus* (Round scad)
- Chloroscombrus chrysurus* (Bumper)
- Trachinotus goode* (Palometa)
- Oligoplites saurus* (Leatherjack)
- Selene vomer* (Atlantic lookdown)

**SCOMBRIDAE:**

- Scomberomorus cavalla* (Kingfish)
- S. regalis* (Cero mackerel)

**HEMIRAMPHIDAE:**

- Hemiramphus brasiliensis* (Ballyhoo)
- H. balao* (Balao)

**BELONIDAE:**

- Strongylura notata* (Redfin needlefish)
- S. timucu* (Timucu)
- Tylosaurus crocodilus* (Houndfish)

**SPHYRAENIDAE:**

- Sphyraena barracuda* (Great barracuda)

Table 2 cont'd

**Fishable Crustacean Species**

**Other Fishable Resources**

**PALINURIDAE:**

- Panulirus argus (Spiny lobster)
- P. guttatus (Chicken lobster)
- Justitia longimanus (long-armed spiny lobster)

**SCYLLARIDAE:**

- Scyllarides aequinoctialis (Spanish lobster)
- Parribacus antarcticus (Sculptured slipper lobster)

**SYNAXIDAE:**

- Palinurellus gundlachi (Furry lobster)

**CALAPPIDAE:**

- Calappa flammea (Box crab)

**CANCRIDAE:**

- Carpilius corallinus (Coral crab)

**MAJIDAE:**

- Mithrax spinosissimus (Spider crab)

**PORTUNIDAE:**

- Callinectes sapidus (Blue crab)
- C. ornatus (Shellig's crab)
- C. danae (Dana swimcrab)
- C. exasperatus (Rugose swimcrab)
- C. bocourti (Blunt-tooth swimcrab)
- C. marginatus (Masked swimcrab)
- Portunus ordwayi (Red swimcrab)
- P. sebae (Redspotted swimcrab)

**PENAEIDAE:**

- Penaeus schmitti (Southern white shrimp)
- P. braziliensis (Redspotted shrimp)
- P. notialis (Southern pin shrimp)
- Trachypenaeus similis (Yellow roughneck shrimp)

**PANDALIDAE:**

- (Unidentified spp.) (Deepwater caridean prawns)

**GASTROPOD MOLLUSCS:**

- Queen conch (Strombus gigas)
- Fighting conch (S. pugilis)
- Milk conch (S. costatus)
- Flame helmet (Cassis flammea)
- Emperor helmet (C. madagascariensis)
- King helmet (C. tuberosus)
- Common whelk (Cittarium pica)

**BIVALVE MOLLUSCS:**

- Mangrove oyster (Crassostrea rhizophorae)
- Flat oyster (Isognomon alatus)

**CEPHALOPOD MOLLUSCS:**

- Reef squid (Sepioteuthis sepioidea)
- Arrow squid (Loligo pealei)
- Common octopus (Octopus vulgaris)
- White-spotted octopus (O. macropus)
- Reef octopus (O. briareus)

**MARINE ALGAE:**

- "Irish moss" (seaweed) (Gracilaria sp.)

(Source: Aiken, 1984)

Fish traps or pots are the predominant methods used for harvesting reef fisheries and crustaceans, the z-shaped trap being the most popular. Other methods include hook & line (used mainly in shallow water) seine nets and spear fishing.

The contribution of fisheries to GDP is estimated to be 0.4%<sup>1</sup>. However although the contribution to GDP is negligible, fisheries in Jamaica is a source of:

- i) local employment and recreation; and
- ii) protein for local diet.

#### i) Employment

The 1982 survey of the Fisheries Division reports that there were some 16,000 registered fishermen, of which 12,000 were engaged full-time in fishing as a source of livelihood. In total the Fishing Industry is thought to support some 150,000 persons.<sup>2</sup>

#### ii) Source of Protein

Domestic fish production contributes substantially to the domestic protein supply of the country. Table 3 shows that in 1985 fish was the second largest source of protein produced in the island.

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<sup>1</sup> Department of Statistics. (1988)

<sup>2</sup> 1987, Natural Resources Conservation Division, (Ministry of Agriculture, Government of Jamaica) and Ralph M. Field Associates Inc., Country Environmental Profile - Jamaica, Kingston p 177.

Table 3

Meat, Fish, Dairy and Legume Production  
1985

Product	Unit million lbs
Beef and Veal	.028043
Goat Flesh	.001565
Pork	.0134
Mutton	.024
Poultry	.050178
Eggs	.0781
Milk	na
Fish <sup>f</sup>	19.1
Legumes	23.9

---

<sup>f</sup> Based on estimates of 1981 fish survey

Source: Adapted from the Economic and Social Survey of Jamaica 1986

According to AGRO 21, in 1985, finfish and shelfish and their derived produce comprise some 35% of the Jamaican diet.<sup>3</sup> During the period 1960-1984 the per capita consumption of fish in Jamaica declined from 30kg / capita/annum to 10kg /capita/annum.<sup>4</sup>

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<sup>3</sup> supra n. 2

<sup>4</sup> ibid.



Source: Adapted from 1985 and 1986 Economic and Social Survey Jamaica - Planning Institute of Jamaica

Year	mil lbs
1980	36
1981	32
1982	18
1983	18.2
1984	18.5
1985	19.1
1986	21.7

Fish Production  
1980-1986 (mil lbs)

Table 4

2.2.1 Fish Production  
Fishes in Jamaica is produced mainly for domestic consumption, with only a few species exported. Significant changes in fish production have not been realised since 1982. This is reflected in Table 4 which gives an estimate of fish production for the period 1980 to 1986.

- i) shortage of foreign exchange to pay for imports;
- ii) increased production of substitutes such as poultry and pigs and;
- iii) low levels of development of aquaculture

This was due to a number of factors such as:

### 2.2.2 Demand and Supply of Fish

The demand for fish in Jamaica exceeds the domestic supply, thus large amount of fish and fish products are imported into the island. The volume of fish imported in the island in 1988 increased by 7.0 percent to 14,161 metric tons. This had a value of US 29,973.<sup>5</sup> The value and volume of fish and fish preparation imported between 1984 and 1988 is given in Table 5.

Table 5

Volume & Value of Fish and Fish Preparation Imported  
1984-1988 (Volume in tons and Value in US '000)

Commodity	1984		1985		1986		1987		1988	
	Vol.	Val.	Vol.	Val.	Vol.	Val	Vol.	Val.	Vol.	Val
Fish (frozen or chilled)	1377	1097	1119	985	464	1055	3681	3256	1438	3482
Herring (salted or dried)	238	302	39	46	215	290	346	489	307	370
Herring (canned)	263	426	464	665	617	917	433	607	898	
Mackerel (salted or dried)	158	199	214	262	786	741	2011	1496	4449	5530
Sardines (canned)	2184	4045	2400	4280	3458	6161	2718	5099	2788	5752
Codfish (dried smoked or salted)	3739	6124	3378	6905	3991	10259	1884	5565	4132	12346
Shrimp	15	112	18	131	19	126	71	638	149	1292
<b>Sub Total</b>	<b>7974</b>	<b>12305</b>	<b>7632</b>	<b>13247</b>	<b>9550</b>	<b>19423</b>	<b>11444</b>	<b>12917</b>	<b>14161</b>	<b>29973</b>

r. revised

Source: Adapted from Economic & Social Survey Jamaica 1988

<sup>5</sup> Economic and Social Survey Jamaica 1988: Planning Institute of Jamaica.

The demand for fish can be expressed as

$$D_f = f( p_f, p_i, \dots, p_n, I )$$

where  $D_f$  = Demand for Fish  
 $p_f$  = Price of Fish  
 $p_i \dots p_n$  = Price of other commodities  
including fish substitutes  
 $I$  = Real Income

The total demand for fish can therefore be estimated from domestic production and imports.

$$D_t = D_d + D_I$$

where  $D_t$  = Total Demand for Fish  
 $D_d$  = Demand for Domestic Production  
 $D_I$  = Import

The supply of fish can be expressed as

$$S_f = f( p_f, n_f, v, \alpha, I )$$

where  $S_f$  = supply of fish  
 $p_f$  = price of fish  
 $v$  = number of vessels  
 $\alpha$  = total fishing stock  
 $I$  = imports

Due to the absence of data, it is not possible to quantify the total demand for and supply of fish for any specific time.

### 2.2.3 Marketing of Fish

Most of the catch from the mainland is disposed of, at fishing beaches and by vendors. Catches originating from the Cays and arriving at the fishing complex may be distributed by middlemen and vendors.

Fish Processing in Jamaica is very limited with only three companies involved in processing fish.

In summary, with the establishment of the EEZ, Jamaica's area of opportunity will be extended, and although at present the resources may be few, there is great potential to be gained by rebuilding the stock, and maintaining such stock over a larger area. In the development of offshore fisheries, certain inputs are required. In reference to the small island states of the Caribbean, it has been stated that;

"requirements for improved communication, technology, air/sea rescue, weather forecasting and adequate information on current flows and direction should be considered as part of any development plan for offshore fishing in the EEZ of these small states."<sup>6</sup>

Under this new regime, the country has the opportunity to participate in the exploitation of surplus stock of neighbouring and other countries within the Caribbean.

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<sup>6</sup> The Integration of Marine Space in National Development Strategies of Small Island States. The Case of the Caribbean States of Grenada and St. Lucia. DOSP, Halifax, Nova Scotia, Canada 1982.

### 2.3 The Tourist Industry

The economic importance of tourism in Jamaica has grown as prices of certain agricultural exports and bauxite have fallen greatly reducing the foreign exchange earnings from these sectors.

Tourism is currently the most important source of foreign exchange. In 1986 tourism contributed 18% to the GNP of the island.<sup>7</sup>

The growth in the tourist sector is reflected in the growth in visitor arrivals and visitor expenditures.

In the period 1983 to 1988, the number of visitors increased from 782,943 to 1,020,293.<sup>8</sup> (see Table 7)

However in 1988 there was a decline in the total visitor arrival by 1.7 percent to 1,020,293 relative to the 1987 figure of 1,037,637.<sup>9</sup> This decline was due to hurricane Gilbert.

The number of cruise ship visitors to the island in 1988 increased by 25.9 percent to 366.52.<sup>10</sup> The total cruise ship calls in the same period totalled 361 as against 301 in 1987.<sup>11</sup>

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<sup>7</sup> Edwards, Felicity (ed). Environmentally Sound Tourism Development in the Caribbean. The Banff Centre School of Management, Barbados, April 1987. University of Calgary Press.

<sup>8</sup> Economic and Social Survey Jamaica 1984 & 1988.

<sup>9</sup> Economic and Social Survey Jamaica 1988. PIOJ

<sup>10</sup> *ibid.*

<sup>11</sup> *ibid.*

Gross visitor expenditure for 1987 and 1988 was US\$95 million dollars and US\$25 million dollars respectively<sup>12</sup>. The decrease of gross visitor expenditure by 11.8 percent was due to the decrease in visitor arrivals.

Table 6 shows the estimated visitor expenditure over the period 1980 - 1988 and Table 7 shows the total visitor arrival between 1983 - 1988.

**Table 6**  
**Estimated Visitor Expenditure 1980 - 1988**

Year	J mil	US mil	% change
1980	430,200	241,700	24.4
1981	220,507	284,300	17.6
1982	248,601	337,800	18.8
1983	877,500	399,200	18.2
1984	1,655,000	406,000	1.9
1985	2,237,400	406,800	0.1
1986	2,838,000	516,000	26.8
1987	3,272,500	595,000	15.3
1988	2,887,500	525,000	11.8

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Source: Statistical Yearbook of Jamaica 1987: STATIN and Economic and Social Survey Jamaica 1988: PIOJ

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<sup>12</sup> supra n. 9

Table 7

Total Visitor Arrival 1983-1988

year	total	% change
1983	782,943	7.7
1984	843,774	7.8
1985	846,716	1.0
1986	954,621	12.7
1987	1,037,637	8.6
1988	1,020,293	-1.7

---

Source: Economic and Social Survey Jamaica 1984 and 1988.

**Employment**

Reducing the level of unemployment has been an ongoing objective by the government. The tourism industry has made a very significant contribution towards achieving this objective. Employment generation from tourism development can be looked at in two spheres; those directly employed in the industry and those employed in the tourist related industries and tourist related activities.

In 1988 some 17,076 jobs were estimated to have been generated in the accomodation subsector in 1988.<sup>13</sup> This represents an increase of 4.5 percent when compared to 16,336 in 1987. Table 8 shows the total employment in visitor accomodation subsector over the period 1980-1988.

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<sup>13</sup> supra n. 9

Table 8

## Direct Employment in Visitor Accomodations In Jamaica

1980 - 1988

Area	1980	1981	1982	1983	1984	1985	1986	1987	1988
Kingston	1124	1145	1230	1014	1380	1347	1336	1289	1247
Montego Bay	4315	4723	4960	4932	5090	5825	6715	6860	6738
Ocho Rios	2930	2860	2721	3044	3688	4251	4292	5004	5208
Port Antonio	300	339	338	370	369	465	381	414	447
Mandeville	75	90	63	66	55	65	70	85	109
Negril	783	1676	1928	1935	1983	1610	2127	2557	3207
Other	-	-	50	76	69	56	129	127	120
Total	9527	10833	11290	11437	12634	13619	15050	16336	17076

Source: Economic and Social Survey 1988



The accomodation subsector includes hotels, guest houses, resort, cottages and apartment. Most of these accomodations are located along the north coast which is endowed with long stretches of beautiful white sand beaches.

Tourist accomodations are also located on the south coast (Kingston) and in the interior of the island.(mainly in Mandeville). (see figure 11)

As a result of tourism development, jobs have also been created in the areas of construction, transportation, entertainment, craft, and many other areas.

Tourism has also assisted in the preservation of cultural and historical heritage of the island.

#### 2.4.Port and Shipping Industry

Marine transport is fundamental to the development of the country due to the strong dependence on imports and exports. The structure of the country's foreign trade includes the exports of raw materials and semi-finished products, and the imports of manufactured and food stuff from developed countries. (see figure 15) In 1988, the value of the total merchandise imports and exports were US 1,427,7 and US831,6 million dollars. This represents a 15.6 percent and 17.3 percent over the 1987 figure.<sup>14</sup>

##### 2.4.1 Shipping

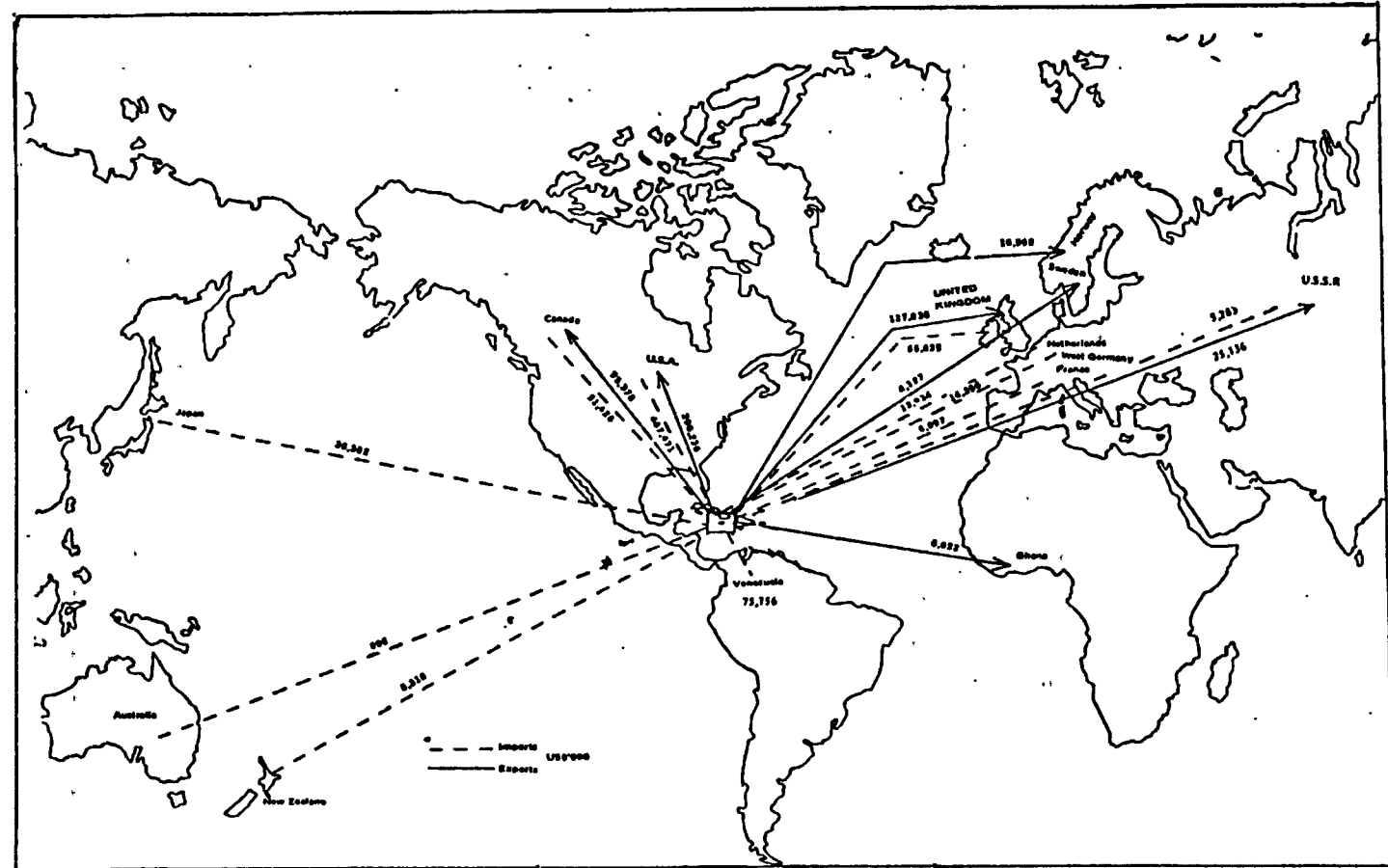
Traditionally the shipping industry in Jamaica was seen mainly as a support industry, with various elements such as port infrastructure, carrier and navigational aspects.

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<sup>14</sup> supra n. 9

# Jamaica's Trade With Major Countries

Figure 15



The industry has developed beyond its traditional support roles and is now recognised as an important industry in itself, encompassing; employment creation, comprehensive infrastructure and economic spin off and income generation

#### i) Employment

The Port and Shipping Industry in the island is currently estimated to employ some 2,000 persons directly, with an annual payroll of 1.75 million Jamaican dollars, with another 10,000 persons directly employed.<sup>15</sup>

#### ii) Income generation

Between 1983-1988, the foreign exchange contribution to the economy from the industry totalled US 112 million dollars.<sup>16</sup>

#### 2.4.2 Ports

There are 15 functional ports along the island's coast. (see figure 13) Kingston and Montego Bay handle general cargo, while the remainder provides for the handling of specialised products such as sugarcane, bananas and alumina.

Kingston is the chief port and one of the best natural harbours in the world.

The two main ports, Kingston and Montego Bay have attracted the establishment of industries and other commercial enterprises as well as Free Trade Zones.

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<sup>15</sup> See Port News Jamaica Vol. 4 No. 3, September 1988

Port Authority of Jamaica

<sup>16</sup> *ibid.*

In 1985 sixteen companies were operating in the Kingston Free Zone employing 6,420 persons.<sup>17</sup> Net foreign exchange earnings to the country resulting from activities of these companies were US 7.2 million dollars.<sup>18</sup>

The Montego Bay Free Trade Zone was opened in 1985 with one factory employing 250 persons.<sup>19</sup>

The only ferry service in the island is from Port Royal to Kingston.

#### 2.4.3 Port Operations

There were 2,198 ship visits to Jamaican ports during 1988.<sup>20</sup> This represents an increase of 5 percent in comparison to 1987 when a total of 2,091 vessels visited.

However, despite the increase in ship visits the total volume of cargo (domestic and transshipment) fell by 6.1 percent to 11,034 mil tons, when compared with 11,747 in 1987. (Table 9)<sup>21</sup>

Total domestic cargo declined by 1.0 percent to 10.4 mil tons while transshipment fell drastically by 49.1 percent to 618 thousand tons.<sup>22</sup> (see Table 9 )

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<sup>17</sup> See Port Authority of Jamaica Annual Report 1986.

<sup>18</sup> *ibid.*

<sup>19</sup> *ibid.*

<sup>20</sup> *supra* n. 9

<sup>21</sup> *ibid.*

<sup>22</sup> *ibid.*

Table 9

## Ports: Ship Traffic &amp; Cargo Flow 1984-1988

	1984	1985	1986	1987	1988	% change
<u>Kingston</u>						
No of Vessels Visits	1290	1343	1297	1273	1327	4.2
Volume of Cargo ('000 tons)	1754	3268	3933	3995	3475	13.0
- Domestic	1209	2349	2658	2782	2857	2.7
- Transshipment	536	919	1275	1213	618	-49.1
<u>Outports</u>						
No of Vessels Visits	786	756	798	818	871	6.5
Volume of Cargo ('000 tons)	885	5893	6777	7752	7559	-2.5
- Landed	1631	1309	1404	1592	1628	2.3
- Loaded	7224	4584	5373	6160	5931	-3.7
<u>Total - All Ports</u>						
No of Vessels Visits	2056	2099	2095	2091	2198	5.1
Volume of Cargo ('000 tons)	10600	9161	10710	11747	11034	-6.1

Source: Economic and Social Survey Jamaica 1988. Planning Institute of Jamaica.

The decline in transshipment was due to the withdrawal of Evergreen Line from Jamaica as a result of illegal drugs being shipped on their vessels. Evergreen had accounted for approximately 60% of all transshipment traffic.

The number of vessels calling at the outports increased by 6.5 percent from 818 in 1987 to 871 in 1988, but the total volume of cargo decreased from 7,752 to 7,559 mil tons.<sup>23</sup> (see figure 9). The fall in cargo loaded at outports was due to the adverse effects on the production sectors by hurricane Gilbert which caused loss of productivity in the agricultural sector especially banana and coffee.

In 1987 there was a total of 161,204 container moves compared to 160,453 in 1986.<sup>24</sup>

## 2.5 Mining and Energy Industry

At present mining in the island is carried out mainly on-shore.

Jamaica is almost totally dependent on the importation of petroleum. In light of its dependence on imported petroleum, the country is vulnerable to any changes affecting the demand, supply and price on the international market. Consequently, the country was affected by the drastic increase in petroleum prices particularly between 1973 and 1980.

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<sup>23</sup> supra n. 9

<sup>24</sup> Economic and Social Survey Jamaica 1987. Planning Institute of Jamaica (PIOJ).

On the other hand, the country benefited from the softening of crude oil prices on the international market during 1987 and 1988.

In 1988, Jamaica's import of petroleum increased by 3.1 percent to 13.1 mil. barrels. The value of the import was US 198.7 million dollars, a decline of 13.9 percent in the value of imports for 1987.<sup>25</sup>

The volume of exports of petroleum products by the Petro-Jam Refinery increased by 178 percent to 807.000 barrels in 1988 at a value of US 15.6 mil dollars.<sup>26</sup>

Attempts were made in the past to explore for offshore oil and gas, but this has not been very successful. However, Jamaica is now in the process of developing with the help of Petro Canada International Assistance Corporation some of the offshore oil and gas fields discarded by the oil majors.

## 2.6 Summary and Conclusion

The Marine Industries particularly tourism, ports and shipping play an important role in the economic development of the island. The fishing industry has not been able to make a very significant contribution because of the many problems it has experienced over the years.

The exploitation of offshore oil and gas has been slow in developing. However, plans are now being put in place for the development of the offshore oil and gas industry.

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25 supra n. 9

26 ibid

Despite the important role of these industries to the economy, these industries have contributed to the deterioration and degradation of the coastal and marine resources and the marine environment. These industries are in fact depleting the resources on which their existence depend. Since the objective of the study is to develop policy recommendations for the sustainable development of the marine and coastal resources, it is pertinent to analyse not only the economic importance of the sector but also to look at the problems associated with these sectors. Analysing the problems will also assist in determining the options and priorities that should be adopted in the planning and management of the uses of the ocean resources and the coastal areas.

Accordingly, this chapter will be followed by an outline of the marine sector problems.



## CHAPTER 3

### MARINE SECTOR PROBLEMS AND ISSUES

#### 3.1 Introduction

Significant contribution is made to the economy by the marine sector. However, this sector is also responsible for some of the environmental problems of the island. This chapter will outline some of the major problems affecting the industries as well as problems generated by the industries.

#### 3.2. Problems of Fisheries

Fisheries is an industry which has considerable potential for development if properly managed. Jamaica's marine fisheries is over exploited and therefore conservation and management measures are needed to re-build the stock. Over the years the fishing industry in Jamaica has been declining as a result of a number of factors such as:

- i) depletion of fish stock;
- ii) use of traditional technology;
- iii) enforcement of fisheries regulations;
- iv) marketing structure and system; and
- v) infrastructure.

##### i) Depletion of fish stock

Depletion of fish stock appears to be one of the main constraints to fisheries development in the island. Since 1982, there has been no significant change in fish pro-

duction. Table 4 of chapter 2 shows that fish production has remained between 18 and 20 million lbs.

The depletion of the fish stock is due to the following:

- a) overfishing;
- b) coastal pollution resulting in marine habitat destruction;
- c) ineffective enforcement of legislations;
- d) level of education of fishing communities; and
- e) illegal fishing practices.

Overfishing occurs because of poor management such as the lack of restriction on the number of fishing licences issued.

Overfishing, especially in the inshore area, is also due to the exploitation of fisheries resources. As catches decline, there has been a significant increase in fishing efforts, with fishermen using smaller mesh size in their nets. This has resulted in the catching of very small size fishes, thus disturbing the reproductive system of the fish stock. For example the total catch per canoe declined from 4,213 kg in 1968 to 2,484 kg. in 1981.<sup>1</sup>

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<sup>1</sup> 1987, Natural Resources Conservation Division (Ministry of Agriculture, Government of Jamaica) and Ralph M. Field Associates Inc., Country Environmental Profile, Kingston, Jamaica

During the same period, the fishing intensity (no of canoes km) increased from 0.45 in 1968 to 0.84 in 1981.<sup>2</sup>

The fisheries resources of the island are also being threatened by developmental activities. A summary of the activities affecting the fisheries resources of Jamaica is given in Table 10.

Table 10  
Development Pressures Affecting Fisheries Resources

GENERAL TREND IMPACTING FISHERIES RESOURCES	LOCATION OF IMPACT	AREA AFFECTED	AREA OF IMPACT	EFFECT/RESULT OF IMPACT	DOCUMENTATION
1. Destruction of Coastal Ecosystems: a) Wetlands	Upper Morass, Black River, St. Elizabeth	1,760 ha	Agricultural Development (Brumdec); Sugar Factory Effluent (Appleton, Holland)	Swamp Drainage; pollution, Destruction of habitat	NRCD, 1982
	Negril Morass, Westmoreland	2,500 ha	Agricultural Development (MDA; Private)	Swamp drainage - as above	NRCD, 1982
	Great Salt Pond, St. Catherine	180 ha	Urban & Recreational Dev. (Hellshire, Fort Clarence) Sugar Factory effluent (Bernard Lodge)	Destruction of breeding and nursery grounds for fish and shrimp; elimination of mariculture potential.	NRCD, 1982
	Great Morass, St. Thomas	1,600 ha	Agricultural Development	Swamp drainage - as above	NRCD, 1982
	Cabarita Swamp, Westmoreland	800 ha	Agricultural Development (MDA; IFU)	As above	NRCD, 1982
	Hague Swamp, Trelawny	200 ha	Agricultural Development (ADC)	Destruction of breeding and nursery grounds; degradation of tourist attraction (the phosphorescent lagoon)	NRCD, 1982
	Turtle Crawl Swamp, Portland	24 ha	Urban Dev. (not known if this was implemented)		NRCD, 1982
	b) Mangrove Forests	Kingston Harbour	52 km <sup>2</sup> Urban Dev. (Portmore, Edgewater Bridgeport) Industrial Dev. (Newport East, Newport West, Airport)	Decimation of stocks of finfish and shrimp through removal of breeding and nursery areas.	Goodbody et al, 1969; 1970; Wade, 1976; Munro, 1971
		Oyster Bay, Falmouth, Trelawny.	N/E Industrial Dev. (Hotel)	As above	NRCD, 1982
		Bogue Island Lagoon, St. James	N/E Industrial Dev. (Hotel)	As above	NONE

<sup>2</sup> supra n. 1

Table 10 : Continued

c) Coral Reefs	North Coast, Jamaica Port Royal, Kingston	N/E	Dredging for harbours, Domestic sewage (hotels), Removal of corals for souvenirs, jewellery, etc. Boating damage.	Structural damage, Destruction of habitat of fish stocks; lowered species diversity.	WADE, 1981 NONE
2. Degradation of Watersheds	Yallahs Watershed Southeastern coastline. 17,800 ha.	N/E	Agricultural Dev. resulting in soil erosion.	Siltation, alteration of coastal ecosystems due to increased nutrient load and suffocation of marine sessile organisms.	NRCD (VARIOUS)
	Hope Watershed. Southeastern coastline. 8,000ha.	N/E	Agriculture; Wild fires as above	As above	As above
	Rio Cobre Watershed South Clarendon & St. Catherine shelf. 64,000 ha.	N/E	As above	As above	As above
3. Pollution of Water Bodies:	Kingston Harbour	As above	Agricultural run-off-fertilizer pesticides; soil erosion via Rio Cobre, Duhaney River, Sandy Gully; Industrial effluents; Domestic sewage; oil pollution.	High bacterial levels, high BOD; loss of fauna and flora; health hazard.	Goodbody, 1970; Wade, 1971, 1976
a) Coastal Areas	Portland Bight, Clarendon. (Not under constant pressure)	260 km <sup>2</sup>	Infrequent oil pollution from shipping (e.g. 1974)	In 1974, a significant spill destroyed fish, crustacean, bird, and mangrove life.	ECS, 1974
	Phosphorescent Lagoon, Trelawny	N/E	Sewage outfall, Falmouth Market; Agricultural & Industrial Dev.	High BOD, nutrient levels.	NRCD, 1982
	Amity Hall Swamp St. Catherine	490 ha	Sugar Factory effluent (Innswood)	High BOD, nutrient load	NRCD, 1982
b) River Systems	Rio Cobre Basin, St. Catherine	N/E	Citrus processing waste; Milk condensing waste.	As above	NRCD, 1980
	Black River, St. Elizabeth; Rio Minho, Clarendon; Cabarita River, Westmoreland.	N/E	Sugar factory effluent	As above	NRCD, 1980
4. Siltation	Kingston Harbour, Montego Bay, Ocho Rios	N/E	Natural run-off; Urban and Agricultural Dev.		WADE, 1971; 1976
5. Coastal Erosion	Johnson Town Fishing Beach, Hanover; White House Fishing Beach, St. Elizabeth; Great River Fishing Beach, St. James.	N/E	Natural processes and man-made intrusions (groynes construction, sand stealing for construction aggregate).	Destruction of beach; Storm damage potential	NRCD on-going study.
6. Population Pressure on Fishery	All Island		Increased population density in coastal communities.	Depletion of fishery resources including non-commercial species.	

## KEY TO TERMS:

- N/E = Not estimated
- ADC = Agricultural Development Corporation
- BOD = Biological Oxygen Demand
- BRUMDEC = Black River Upper Morass Development Corporation
- MDA = Ministry of Agriculture
- IFU = Inland Fisheries Unit

#### **ii) Traditional Technology**

The use of traditional fishing methods have affected fisheries production in the island. The use of dynamite and fish poison or intoxicants which are often used in the island to catch fish have also resulted in the destruction of coral, mangrove and wetland areas which are important breeding grounds for fish species, and other marine organisms and for protecting the island from erosion.

#### **iii) Enforcement of Fisheries Regulation**

The enforcement of the Fishing Industry Act and other related laws is a major problem in the island. The difficulty in enforcement measures is due to the lack of financial and human resources of the Fisheries Division of the Ministry of Agriculture, which is the main department responsible for fisheries.

The inadequate financial resources result in the resource management institution's inability to attract and retain qualified and trained persons. The financial problems also retard the implementation of management programmes. In addition, the Fisheries Division does not gain much attention as other areas in the Ministry, such as, livestock and forestry.

#### **iv) Marketing Structure and Systems**

The domestic catch is usually marketed by the "higgler system" which is highly inefficient and very costly to the consumer. The storage and icemaking facilities are also limited and thus contribute to the problems of marketing and distribution of the catch.

#### v) Infrastructure

Adequate infrastructure such as landing areas, boat repair facilities, and storage facilities for boats and nets are lacking.

#### vi) Dissemination of Information

Basic information on fish stock, sustainable yield and fishing grounds is either lacking or is not available to be used by the Fisheries Division or other interested parties. This makes forecasting and controlling of stock very difficult.

Table 11 summarises the problems and causes.

Table 11.

Problems	Factors
1. Depletion of Fish Stock	<ul style="list-style-type: none"><li>- Overfishing</li><li>- Coastal pollution resulting in the destruction of coastal and marine habitat.</li><li>- Ineffective enforcement of legislation.</li><li>- Level of education of fishing communities.</li><li>- Illegal fishing practices.</li><li>- Developmental activities.</li><li>- Use of traditional fishing methods and the use of explosives, chemicals and other fish intoxicants.</li></ul>

Table 11 cont'd

Problems	Factors
2. Enforcement of Fisheries Regulations	<ul style="list-style-type: none"> <li>- Human and financial constraints.</li> <li>- Lack of proper fisheries guidelines.</li> </ul>
3. Marketing Structure and System	<ul style="list-style-type: none"> <li>- Inadequate landing areas storage facilities, vessel repair and maintenance.</li> </ul>

### 3.3 Environmental Impact of Tourism

Tourism is one of the development sectors in which environmental integrity is very important, thus, destroying the environment is tantamount to destroying the industry.

The expansion and growth in the tourism sector, has led to the increase in visitor arrivals and the development of tourist facilities including hotels, guest houses and cottages, all located mainly along coastal areas. The expansion of the tourism sector has occurred without due regard to the environment. This is illustrated by the increased incidences of beach erosion due to the disposal of inadequately treated sewage into coastal waters and waters adjacent to swimming areas.

The disposal of raw and partially treated sewage not only leads to beach and shoreline erosion, but it also affects human health.

The NRCD water quality monitoring programme of the north coast beaches which started in 1979 has recorded higher than acceptable levels of fecal coliform of recreational swimming beaches. In addition to the direct effects on the users of the beach and coastal waters, this pollutant leads to rapid growth of seaweed, which eventually causes damage to the nearby coral reefs.

The problem of beach erosion is further reinforced by the elimination of dune barriers by hotels and the construction of public beaches. For example, in Montego Bay, land has been reclaimed for beach construction activities and the development of the Seawind Beach Hotel. Land reclamation has also occurred in other areas, including Ocho Rios, Kingston and Montego Bay to create beaches, resort areas and cruise ship piers.

The depletion of coral reefs is also aggravated by souvenir hunters, collectors and careless visitors.

The linkages created by tourism development, have also helped to accelerate the environmental problems of the island. For example, items produced by craft industries for sale to tourists as souvenirs, have resulted in the reduction of black coral formation and coral reefs.

To counteract these problems, the government needs to develop programmes, to ensure that all tourism development plans are accompanied by an environmental impact assessment statement. To achieve the desired result of balancing environmental protection with tourism development, the planners, administrators, environmentalists and tourism developers need to work in close collaboration with each other.



The problems resulting from uncontrolled and poorly planned tourism development are summarised in Table 12.

**Table 12.**

**Summary of Problems of the Tourist Industry:**

1. Beach and shoreline erosion due to untreated or insufficiently treated sewage which is discharged into coastal waters and beach areas.
2. Damage and erosion of beaches as a result of break-water construction, mining of sand to build hotels and related facilities.
3. The destruction of coral reefs by careless visitors and by souvenir sellers. Coral reefs are also destroyed due to the disposal of sewage from hotel accommodations, into the coastal and marine environment.

With all the problems relating to the tourism sector, it is now evident that tourism cannot be planned on a narrow basis, but should be a part of the comprehensive development and land-use planning. Tourism development is linked not only to resource and environmental management but also to other sectors of the economy.

### **3.4 Environmental Impact of Port Development and Shipping Activities**

The main activities of port development that have an impact on the environment are dredging, and loading and unloading of oil. Shipping activities that have potential hazardous effects on the marine environment are the transportation of oil, oil refinery, ballasting and clea-

ning of tanks.

Jamaica is situated in the Caribbean region which is potentially one of the largest oil producing areas of the world. The combination of high volume of traffic in the Caribbean, and the major oil and gas extraction, exploration, and drilling makes the region particularly vulnerable to oil spills and related hydrocarbon releases, that pollute the water and threaten the fragile marine and coastal ecosystem. The occurrence of oil pollution in coastal waters of Jamaica has increased significantly in the last thirty years, due to shipping and refinery, and the development of oil related industries along the coasts of Jamaica.

Oil pollution has resulted from oil related industries such as the Esso Oil Refinery, Texaco storage facilities at Port Esquivel, and the Reynolds Pier in Ocho Rios.

Since its inception in 1963, the Esso Oil Refinery, now Petrojam, has been a source of pollution to the Kingston Harbour due to inadequate treatment and pipeline leakages.

In 1981, the ground water of the Ocho Rios area was contaminated as a result of leakage in the pipeline on the Reynolds Pier.

Leakage in the Texaco Oil Storage pipeline at Port Esquivel has also affected beaches, seagrasses, mangroves and fauna. In January 1984, there was a pipeline discharge of 50 barrels of oil into the sea from the Texaco Oil storage facilities.

In addition to oil spills and leakages, there are significant discharges of oil, offshore as well as into ports and harbours as a result of ballasting, ship cleaning and tank washing. For example, the discharge of ballast near harbours has affected the Port Royal mangroves and sessile organisms such as oysters which are sensitive to oil spills.

Shipping accidents have also affected the coastal and marine environment. In 1974, the NVC SANKATY with 1,500 tons of sulphur aboard, ran aground at Bare Bush Cay, Portland Bight and 170 tons of sulphur were dumped overboard in order to float the ship. The sulphur deposit was spread over an area of approximately 6,000 square feet and had filled the holes and crevices between the underlying corals.

Also, in 1985, 1,200 tons of ferrosilicone ore were dumped into the sea floor from a ship which ran aground in the Pedro Banks area.

The need for regional cooperation in the Caribbean is very important as small quantities of oil from local spills can be carried by currents to other areas, hence destroying the resources and the environment of that area.

### **3.5 Environmental Impact of Offshore Mining**

Although the exploitation of offshore oil and gas is limited, the potential environmental impact should be included in the long term development strategies. The potential negative effects such as environmental disasters, conflicts with other ocean uses such as fisheries, shipping and to some extent tourism should be incorpora-

ted in the national development plan.

### 3.6 Conflicts Within the Marine Sector.

The developments in fisheries, tourism, ports and shipping are important because of the contribution they make to the economy. However, the activities of these industries have led to the deterioration and degradation of the coastal area and the marine environment.

In addition, these activities compete for the same resources and thus, are in conflict with each other. Also, activities in the marine field have not been treated in an integrated manner. As shown, they have been broken down into various sectors. Consequently, policies for these sectors have been developed independently of each other. Although these industries at present are conflicting and competing for the same resources, if properly managed they can complement each other and can link up with other sectors in the economic system. The linking and interaction among these sectors are important elements in the concept of a national integrated marine policy. The benefits to be gained by allocating resources to other sectors will depend on the functioning of the other sectors. For example, the tourism sector depends on the transportation and communication system, agriculture, industry and to a lesser extent on fisheries. Thus, the expansion in tourism, will have an impact on these sectors.

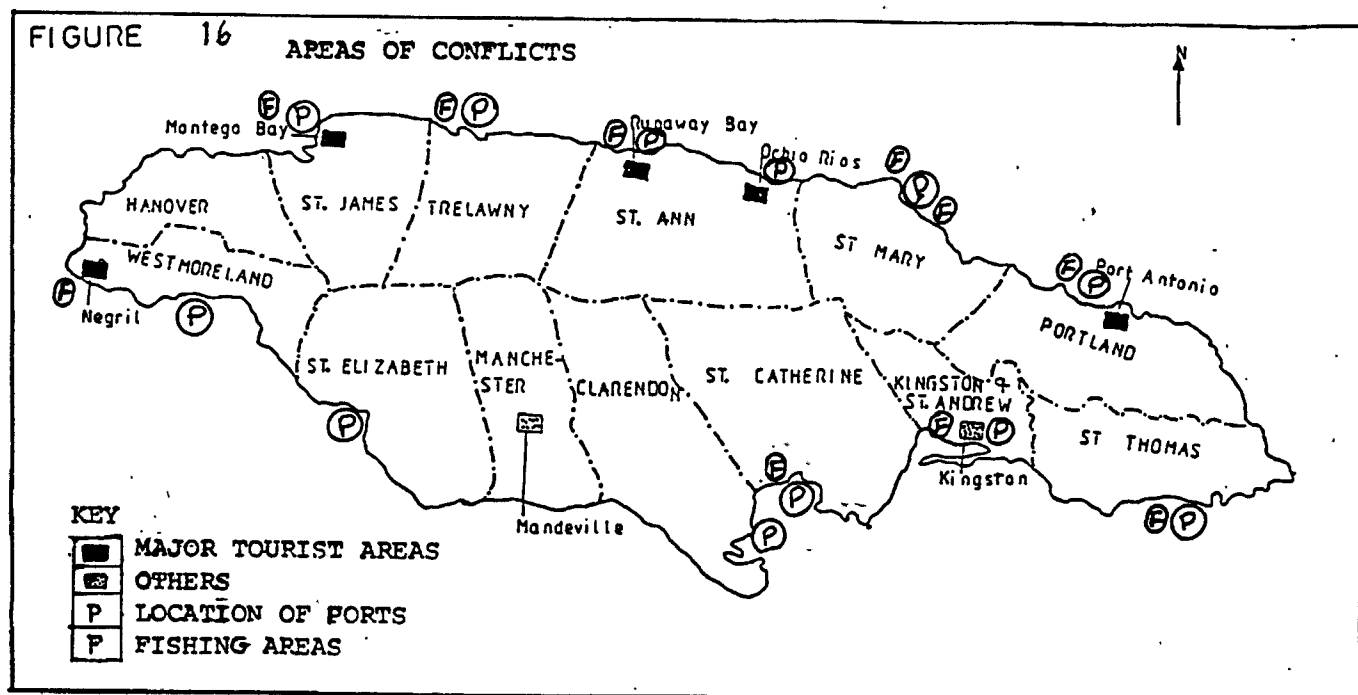
The conflicts within the marine sector can be summarised as follows.

1. Destruction of habitat through activities such as development of marinas, harbour and coastal resources.
2. Destruction of fisheries resources due to industrial,

agricultural and urban waste disposal into rivers, inland and coastal waters.

3. Damage to ports and harbours due to inadequately treated domestic and industrial wastes.
4. Damage to beaches by shipping activities such as ballasting, tank washing and accidental oil spills.
5. Increased vulnerability of coastal areas, coastal facilities and communities due to the removal of coral resources for tourism .
6. Damage of water quality as well as the coral resources due to waste disposal in marine areas.
7. Conflict between the demand for ecosystem preservation such as estuaries, mangroves and coral, marine parks versus the demand for economic development such as tourism, aquaculture, industry, and community development.

Figure 16 depicts some of the areas of conflicts in the island.



### 3.7 Summary and Conclusion

The problems generated by the marine sector are only one aspect of the total environmental problems of the island. Industrial development, agriculture and other activities also have deleterious effects on the marine and coastal environment. The major marine environmental problems will now be discussed in chapter 4.

## CHAPTER 4

### MARINE ENVIRONMENTAL ISSUES

#### 4.1 Introduction

This chapter presents an overview of some aspect of the marine and coastal ecosystem of Jamaica, the major marine environmental problems and policy issues relating to the preservation and protection of the marine environment. Some of the marine and coastal ecosystem of the island which are seriously threatened by population pressure and economic development will first be outlined.

#### 4.2. The Marine and Coastal Ecosystem

##### .1. Beaches

Jamaica is endowed with approximately 105 beaches which are used by locals and tourists. Some of these beaches are of international renown and are one of the most widely used natural resources of the island. They attract tourists because of their aesthetically pleasing natural setting, and the opportunity for swimming, as well as other associated activities such as pleasure boating, yatching, sports fishing, and surfing. Most of the tourists resorts are associated with stretches of white sand beaches which are found mainly along the north coast. (see figure 4)

The beaches are also important for protecting the uplands from the effects of hurricane induced storm surges and coastal flooding. They are also important habitats for a wide range of flora and fauna and are particularly important as nursery areas for sea turtles.

## .2. Mangroves and Wetlands

In Jamaica mangroves and herbaceous swamps which contain deposits of peat and alluvial cover over 30% of the coast line.<sup>1</sup> (see figure 4)

In their natural states mangroves help stabilize coastal areas by reducing wind damage, and wave energy during storm and by checking soil erosion.

The mangrove areas support a number of plant species such as the *Rhizophora mangle* (red mangrove), *Languncularia racemosa* (the white mangrove), *Avicennia germinans* (the black mangrove) and *Conocarpus erectus* and the swamp ferns (*Acrostichum*)<sup>2</sup>

Mangrove is recognised as one of the world's most productive ecosystem in both gross and primary productivity and leaf litter production.

Mangroves are also important as breeding and feeding areas of many species of wildlife including crocodiles. Mangroves trap inorganic nutrients carried down from watershed by rivers, converting them into organic compound that enters the mangrove associated food chains.

Mangroves are direct sources of fuel and charcoal and mangrove swamps are usually regarded as marginal lands and have been used for major development projects.

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<sup>1</sup> 1987, Natural Resources Conservation Division (Ministry of Agriculture, Government of Jamaica) and Ralph M. Field Assoc. Inc., Country Environmental Profile Kingston, Jamaica.

<sup>2</sup> *ibid.*



The PortMore area of Metropolitan Kingston provides an example of poor development of a former productive wetland. This area now accommodates some 80,000 people, whose homes are so located that they are periodically exposed to flooding from both sea and upland runoff. Other areas of the island are also threatened by social and economic activities.

There are a number of wetlands in Jamaica, the two largest of which are the Negril Morass (5,657 acres) and the Black River Lower Morass (15,000 acres). (see figure 18 ) These wetland areas support a number of plant species which are listed in Table 13.

In addition large peat deposits have been found in the Negril Morass and the Black River Morass and is being explored as a source of energy. (see figure 17)

Smaller deposits are found in St. Thomas, St. Mary, Trelawny and Westmoreland.

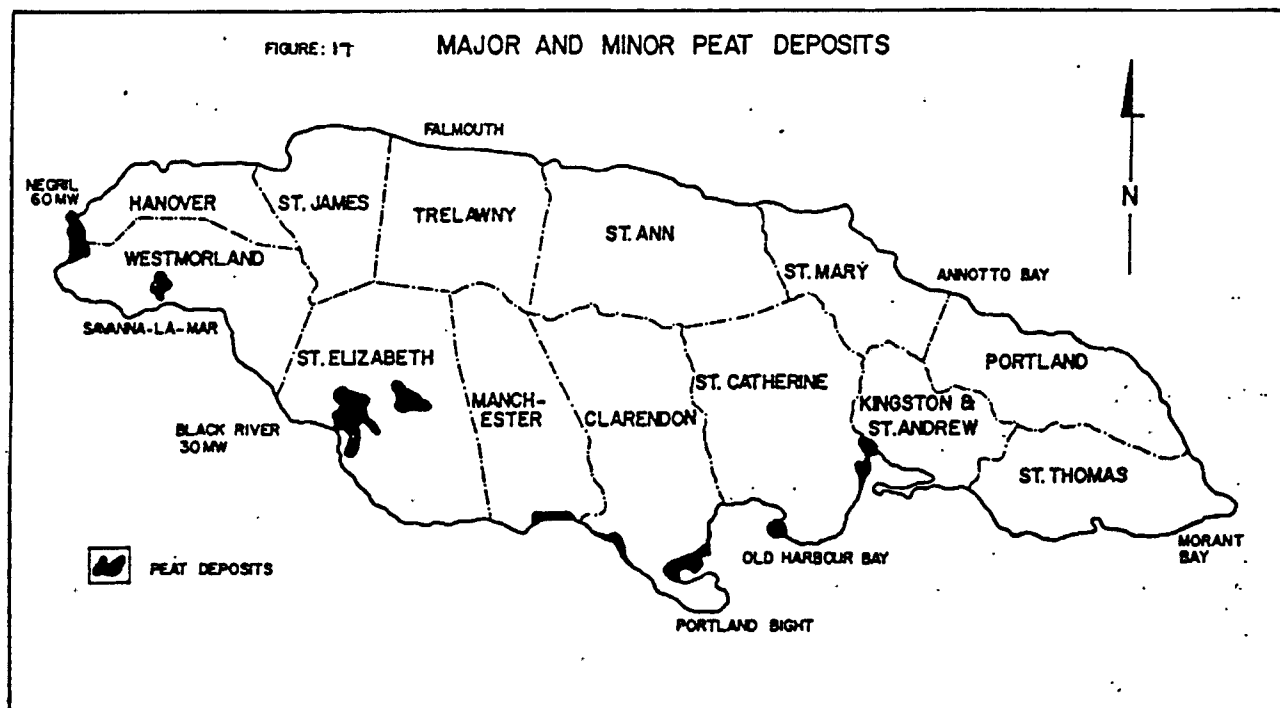


Table 13:  
Number of Species in Plant Communities, Negril Morass

Plant Community	No. of Species	Dominant Species
<u>Cladium - Sagittaria</u> Association	12	<u>Cladium jamaicense</u> <u>Sagittaria langeifolia</u> <u>Ipomea sagitata</u>
Hummocky Swamp	22	<u>C. jamaicense</u>
<u>Roystonea</u> Forest	14	<u>Roystonea sp.</u>
Conocarpus Forest	23	<u>Conocarpus erectus</u> <u>C. jamaicense</u>
<u>Sabal</u> Forest		<u>Sabal jamaicensis</u>
Mixed Swamp-Margin Forest	5	<u>C. erectus</u> <u>Rhizophora mangle</u> <u>Avicennia nitida</u> <u>Languncularia racemosa</u>
<u>Scleria</u> Association	8	<u>Scleria eggersiana</u>
<u>Cyperus giganteus</u> Association	6	<u>Cyperus giganteus</u>
Conocarpus shrub/ <u>Acrostichum</u> Association	11	<u>Dalbergia ecastaphyllum</u> <u>Acrostichum aureum</u>

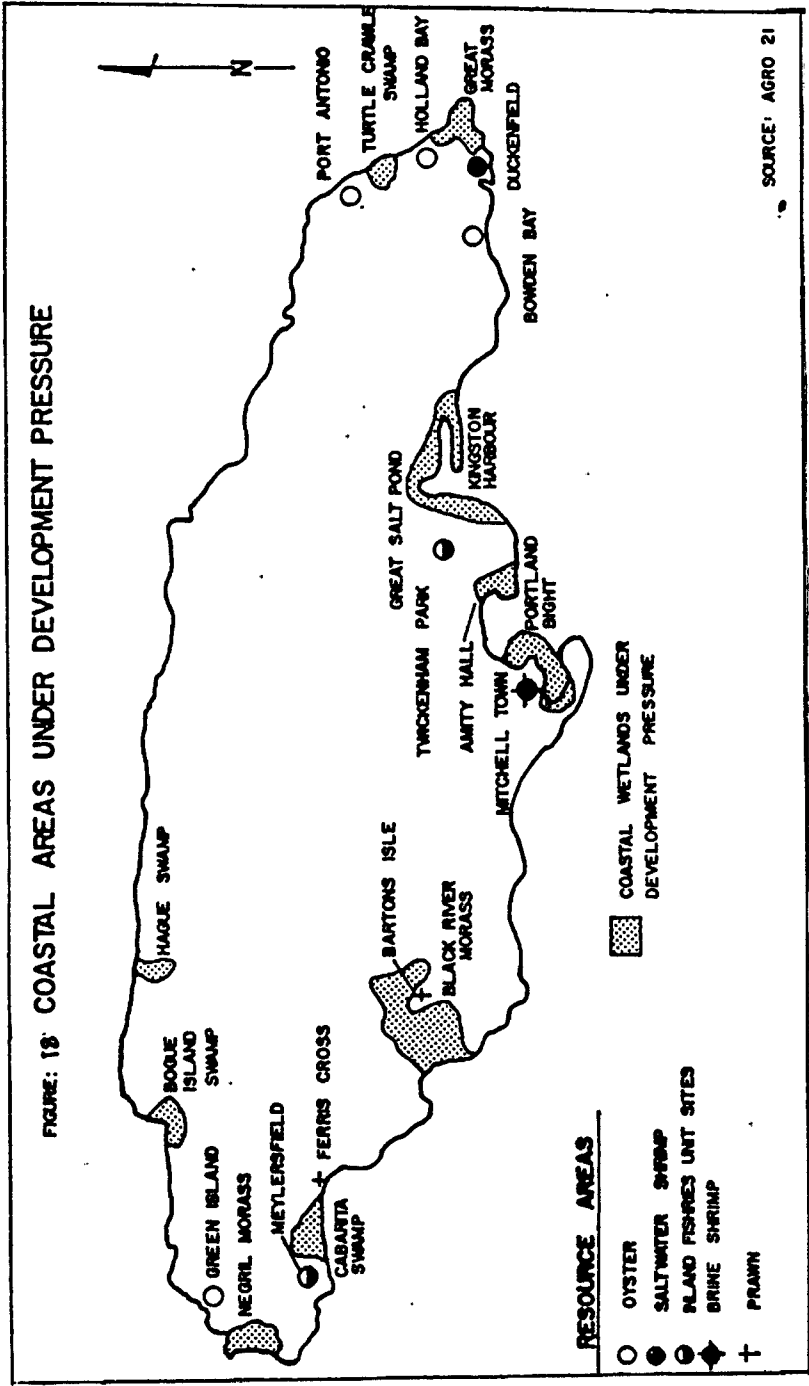
Source: Compiled from Coke, et al., 1982.

**Table 13:**  
**Number of Species in Each Plant Community,**  
**Black River Lower Morass**

<u>Plant Community</u>	<u>No. of Species</u>	<u>Dominant Species</u>
Mangrove Forest	10	<u>Rhizophora mangle</u> <u>Conocarpus erectus</u>
Swamp Forest	47	<u>Rostonea princeps</u> <u>Grias cauliflora</u>
<u>Crinum/Sagittaria</u> Zone	20	<u>Crinum americanum</u> <u>Sagittaria lancifolia</u>
<u>Scirpus Olneyi</u> Zone	8	<u>Scirpus olneyi</u>
Hummocky Swamp	24	<u>Cladium jamaicense</u> <u>Lippia nodiflora</u>
Thick <u>Cladium</u> Zone	19	<u>Cladium jamaicense</u>
<u>Typha</u> Zone	33	<u>Typha domingensis</u> <u>Cyperus giganteus</u>
<u>Typha</u> Hummocky Swamp	16	<u>Cladium jamaicense</u> <u>Eleocharis cellulosa</u>
<u>Cladium/Sagittaria</u> Association	41	<u>Cladium jamaicense</u> <u>Sagittaria lancifolia</u>
<u>Typha/Thalia</u> Zone	17	<u>Typha domingensis</u> <u>Thalia geniculata</u>
<u>Cladium/Conocarpus</u> Zone	14	<u>Conocarpus erectus</u>

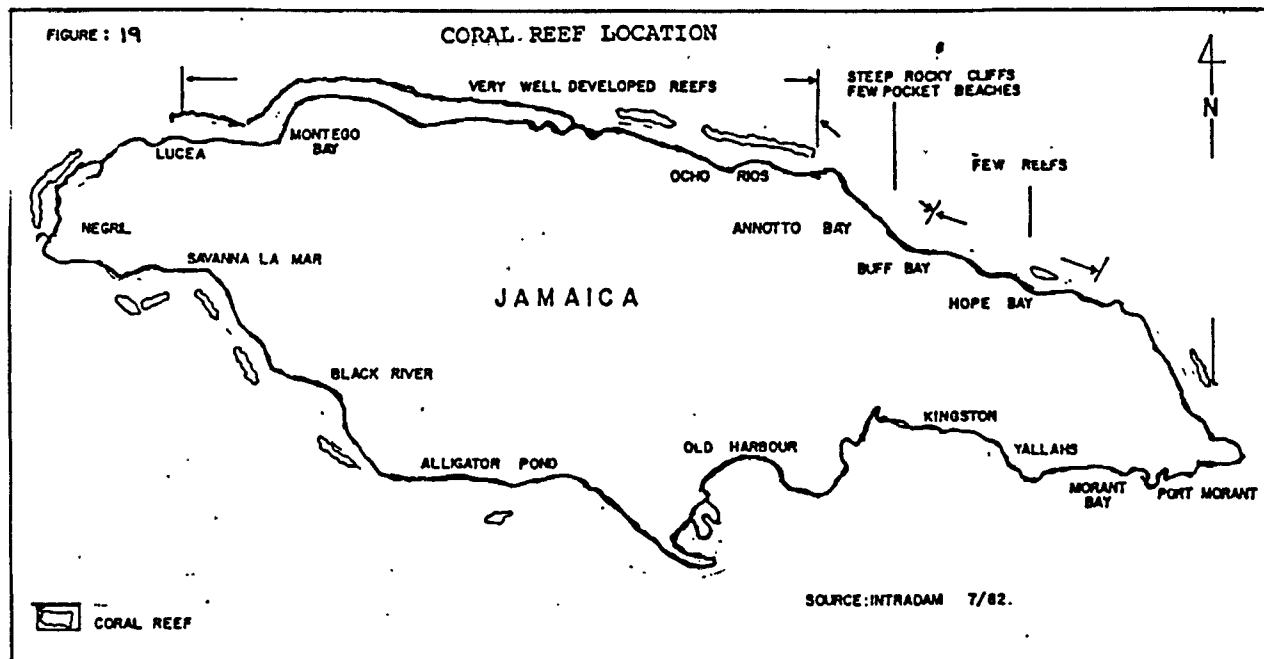
Source: JICA (1983); After Coke et. al. (1982) and NRCD & TGI (1981).

These very important areas are now threatened by mari-  
culture and fisheries activities. (figure 18)



### .3. Coral Reefs

Coral reefs are found mainly along the north coast. (figure 19) These coral reefs serve many functions such as: habitat for numerous species of flora and fauna, fishing and recreational uses, coastal protection, jewelry items for aesthetic and related economic benefits and for scientific and educational uses.



### .4. Seagrass and Algal Beds

Seagrass beds are prime nursery areas for a number of marine species. Seagrass beds also serve as protective barriers for the island from erosion resulting from hurricane induced storm surges. Through their rootlike rhizomes seagrass beds bind the sand giving the substrate a stability that inhibits sand transport during period of oceanic turbulence.

### 4.3 The Marine Environment

The marine environment plays a significant role in the sustainable economic growth of the island. The marine environment may be used for several purposes simultaneously. These uses may be complementary but in most cases they are conflicting.

#### 4.3.1 Major Environmental Problems

Jamaica is faced with many old, new and emerging environmental problems, some of which, on the one hand, are caused by the operations of some industrial enterprises, while on the other hand are caused or enhanced by the population at large. Jamaica's major environmental problems are considered to have started with the second wave of its industrial development particularly during the 1960's.

The major environmental problems identified are:

- i) deforestation;
- ii) beach and shoreline erosion;
- iii) wildlife and wildlife destruction habitat;
- iv) destruction and degradation of coastal and marine resources and;
- v) pollution of the coastal and marine environment.

#### i) Deforestation

The total land area under forest is estimated to be 660,000 acres or 24.3% of the island's total land mass.<sup>2</sup>

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<sup>2</sup> supra n. 1

Each year millions of hectares are lost due to deforestation.

The process of deforestation is enhanced by the economic and cultural conditions of the country.

Some of the factors contributing to deforestation are:

- a) agricultural practice of clearing land using the "slash and burn method";
- b) the removal of mangroves for fuel and siltation and;
- c) urbanisation which results in clearing of large areas of forest land.

One of the most serious ecological consequence of deforestation is soil erosion, which leads to the destruction of the soil characteristics and fertility, and in hilly or mountainous areas encourage landslides.

It is estimated that approximately 40-50 tons of top soil per acre are lost each year due to soil erosion.<sup>3</sup> Other consequences of deforestation are the destruction of marine and coastal resources and their habitat, and the erosion of beaches and shoreline areas. Deforestation has also contributed to the increased coastal sedimentation thereby destroying coastal ecosystem and fisheries base.

#### ii) Beach and Shoreline Erosion

Beach and shoreline erosion occurs as a result of illegal removal of sand, and normal processes involving wind currents and waves.

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<sup>3</sup> supra n. 1

The illegal removal of sand and resulting beach erosion have caused serious problems in Johnston Tower in Hanover, Hope wharf in Westmoreland, Crave River in St. Elizabeth and Mahoe Bay and Rose Hall in St. James.

The erection of protective structures such as seawalls and groynes have also contributed to coastal and beach erosion. The erosion of the beaches have significant impact for the tourism industry, because the beaches are one of Jamaica's finest natural resources for tourists. Figure 2D shows areas that are experiencing beach and shoreline erosion.

#### iii) Wildlife and Wildlife Destruction Habitat

Wildlife and wildlife habitat have been destroyed by the filling of mangrove areas for housing accommodation, pollution of the marine environment and by some fishing practices.

Hunting has also resulted in the depletion of certain wildlife species such as the Caribbean Monk Seal (*Manachus Tropicalus*) and the West Indian Manatee (*Trichechus manatus*).

#### iv) Destruction and Degradation of Coastal and Marine Resources

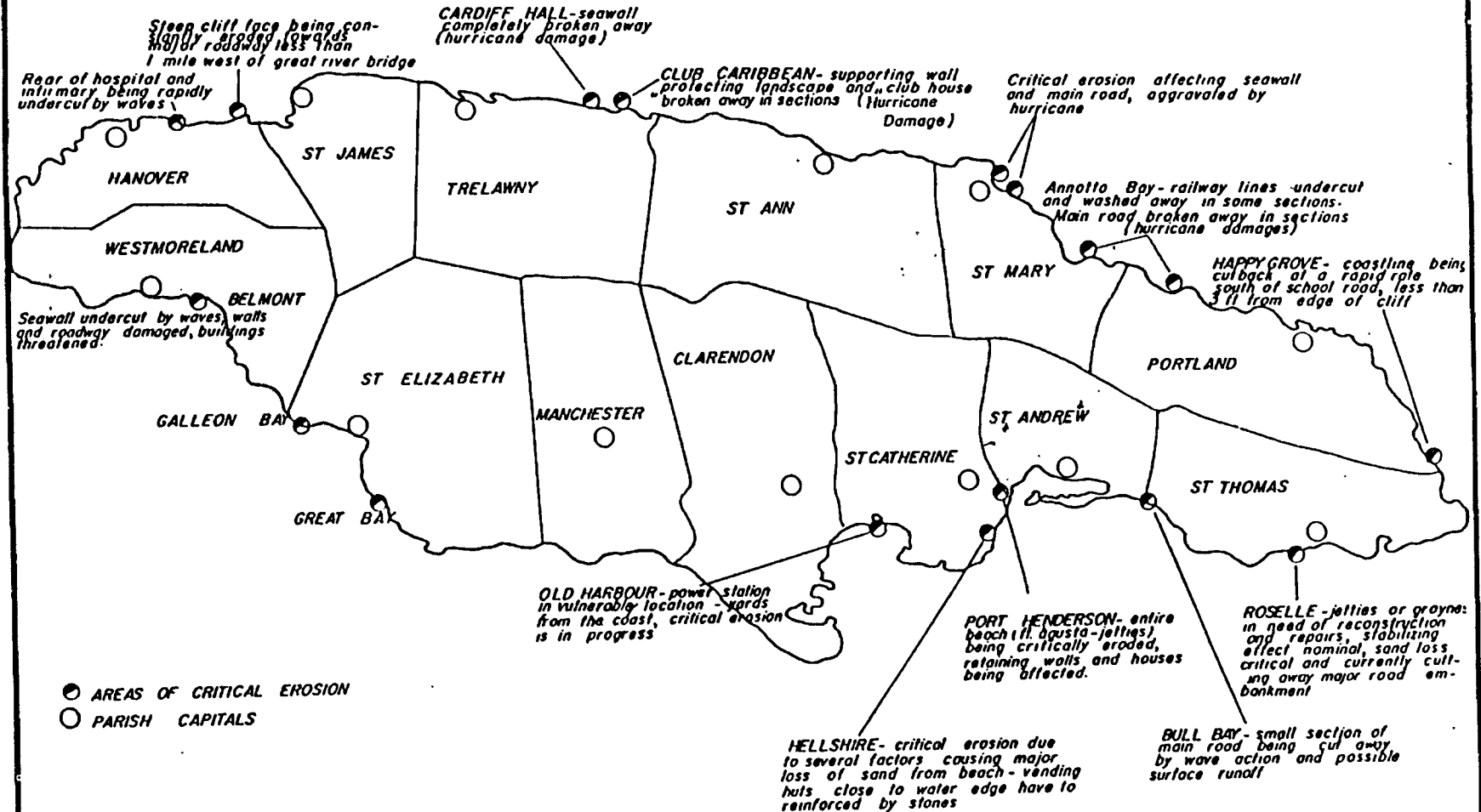
The destruction and degradation of the coastal and marine resources of the island is as a result of a number of activities such as:

- construction of tourism facilities;
- use of wetland areas for housing accommodation;
- discharge of waste disposal into coastal waters;
- sand mining, which ultimately leads to coastal erosion



Figure 2o

# AREAS OF CRITICAL BEACH EROSION



Source: Natural Resources Conservation Division.

- and the destruction of coastal resources;
- overfishing and the use of illegal fishing practices;
- pollution from land-based activities and from shipping resulting in degraded inshore environment and fishery nursery grounds along the reefs;
- natural disasters such as hurricane and storm surges.

#### **v) Pollution of Coastal and Marine Environment**

According to the Convention on the Law of the Sea, pollution of the marine environment means " the introduction by man, directly or indirectly, of substances or energy into the marine environment, including estuaries, which results or is likely to result in such deleterious effects as harm to living resources and marine life, hazard to human health, hindrance to marine activities including fisheries and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of amenities."<sup>4</sup>

The impact of pollution on the marine and coastal resources as well as the marine environment of the island poses an increasing threat to the sustainable development of the coastal and marine resources.

The major contributors to the pollution of Jamaica's inland and coastal waters are: urbanisation, industry, agriculture and tourism. Marine activities such as shipping and oil and gas exploration also aggravate the pollution problems of the island. These problems represent a potential threat to the sustainable development of the island's resources.

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<sup>4</sup> See Article 1 paragraph 4 of the United Nations Law of the Sea Convention.

#### a) Urbanisation

Concomitant with coastal development is coastal urbanisation.<sup>5</sup> More than 80% of the total population of Jamaica live within 5 miles of the coast, and the majority of urban and industrial activities are situated in the same area, thereby greatly affecting the coastal and adjacent marine environment.

The availability of facilities such as water, electricity and sewage disposal facilities have not kept up with the increase in population in the coastal areas hence the sea has become an easily available depository for sewage disposal.

Expansion of the island's urban centers has resulted in the discharge of inadequately treated sewage which has led to the destruction of mangrove swamps, thereby reducing nursery areas of fish and shrimp species and increasing the vulnerability of the island to coastal flooding.

Sewage discharged into water bodies is a potential hazard to human health, coastal resources and the marine environment.

Signs of high concentration of sewage in seaweed have been noticed in the Hellshire area, a newly developed landfill area. The destruction of life in this area consists of various components. Firstly, the sewage nourishes the floating algae which floats and covers the reefs, thus choking the reef organisms.

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<sup>5</sup> Thacher, Peter S. & Meith, Nikke. The Caribbean Example. Ocean Yearbook 3, UNEP. University of Chicago Press 1987.

Secondly, as the living components of the reef are suffocated by the seaweed, natural water erosion breaks down the reef faster than it is being regenerated. This is followed by beach erosion which takes place due to increase wave action on less protected areas.

Domestic sewage disposal into coastal waters in the Kingston Area is also of grave concern. It has been recorded that only 36% of household within the Kingston Metropolitan area is connected to the municipal sewage system.<sup>6</sup>

#### **b) Industry**

Jamaica, like many countries engage in industrialization to contribute to the economic development of the country. However, industrial development has created one of the island's persistent environmental problems - industrial pollution.

Industrialization in Jamaica began some 300 years ago with the production of rum, sugar and molasses. These industries, some of which are developed largely along the coast have been a threat to the coastal areas and the marine environment, through direct injection of wastes, alteration of the coastal area and run-off pollution.

Despite the creation of several institutions to address environmental problems resulting from development, these problems have still persisted.

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<sup>6</sup> UNEP Draft Regional Overview of Environment Programme. Priorities Affecting the Coastal and Marine Resources of the Wider Caribbean. (Meeting of Experts on the CEP, Mexico City, 7-9 September 1988)

With the ineffectiveness of the institutions and poor enforceable rules and regulations on safety standards, industrial development has been pursued with very little or no regard to the adverse impact it might have on the natural environment.

Release of industrial effluents into inland and coastal water bodies come from industries such as the Sugar Industry, the Bauxite and Aluminium Industry, Detergent Industry, Distilleries and Essential Oils Industry.

The waste disposals, some of which are characterised by high biological oxygen demand (bod) and chemical oxygen demand (cod) and caustic soda impurities (red mud from bauxite mining) when disposed of into water bodies contaminate aquifer, streams and rivers and disrupt the ecosystems and causing deleterious effects on the marine resources.

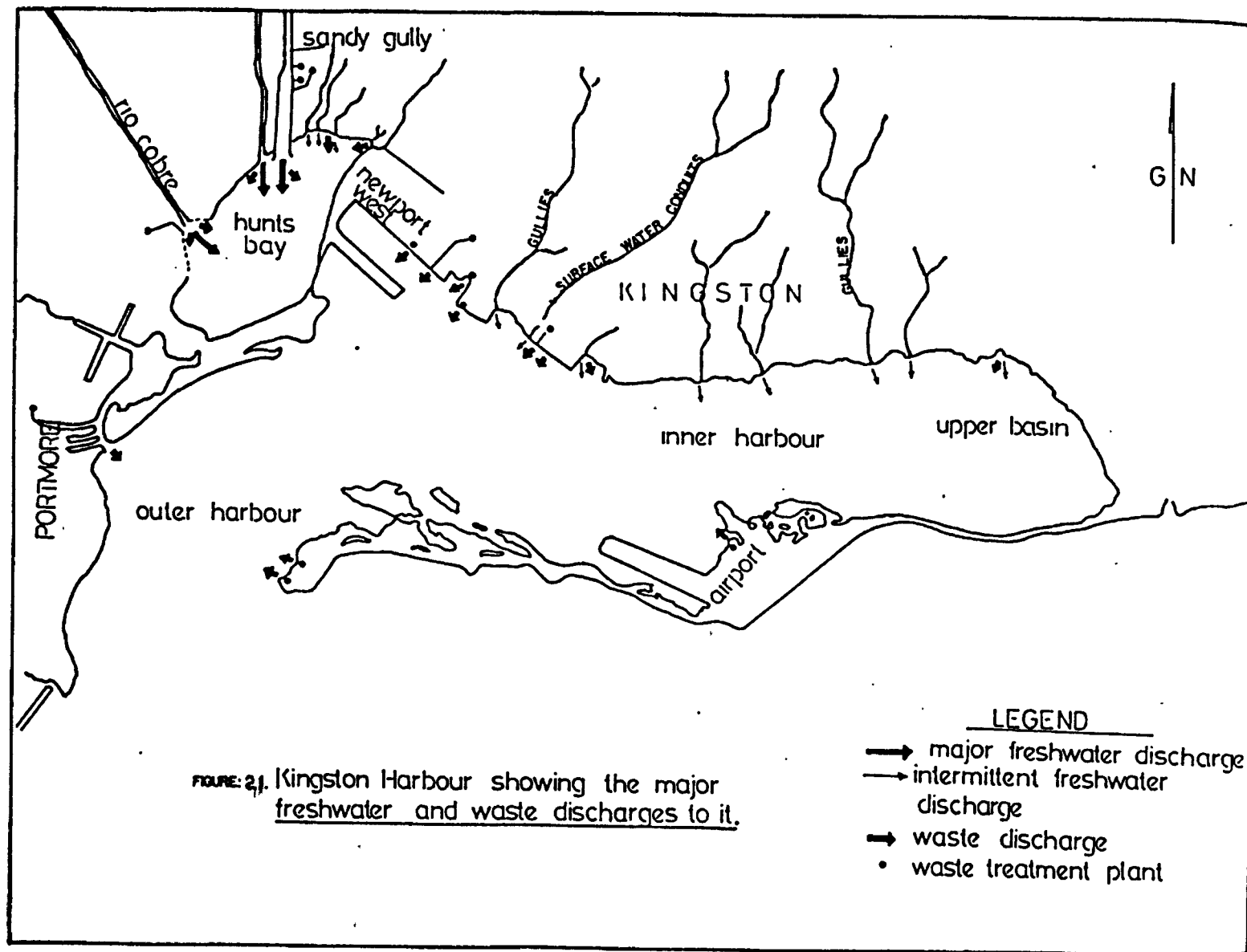
/An area that has suffered drastically from the disposal of inadequately treated industrial waste is the Kingston Harbour.(see figure 21)

Kingston Harbour is said to be subjected to pollution from at least 10 documented point sources.<sup>7</sup> It is now seriously polluted by effluent discharged from slaughter houses, gullies, the fats and edible oil industries and sewage treatment plants.<sup>8</sup>

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<sup>7</sup> See Natural Resources Conservation Division (NRCD) Kingston Harbour Pollution Monitoring File No.2/4/16, (Wade 1976)

<sup>8</sup> supra n. 1



The Harbour which was formerly a prolific fishing area has been destroyed to such an extent that all forms of benthic life has been destroyed by effluents. In addition, plumes of nutrient rich water emanating from the Harbour have encouraged the proliferation of algae, and the smothering of coral reefs along the south coast of the island.<sup>9</sup>

Another area of great concern is the Rockfort Industrial Complex, which contains six major industries. These expel pollutants of various types into the environment. Very recently, fishermen in the Rockfort area have complained about oil spills from the Jamaica Public Service (JPS) power barge. The oil spills have affected the marine resources of that area, as well as the fishermen's nets and boats. The Rockfort beach is also being affected by residue of oil from the barge.

Industrial waste also poses serious threats to the development of other economic activities such as tourism and fisheries, which depend on a healthy environment.

The disposal of liquid waste remains a pressing problem, as there is at present, no effective enforcement measures for the pre-treatment of industrial wastes before their discharge into sewers or directly or indirectly into open water bodies.

#### **c. Agriculture**

Marine pollution is also caused by agricultural activities such as the release of insecticides, and pesticides into water tables.

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<sup>9</sup> supra n. 1

Increase in agricultural production has led to the increase in the use of large quantities of artificial fertilizers and a variety of pesticides and insecticides. This has resulted in ground and surface water contamination as well as contamination of nearshore coastal water.

The agricultural four main ecological impacts on the island are: soil erosion, depletion of forest resources, ground water contamination and reduced stream flows.

In terms of the use of pesticides the government needs to take steps to develop and monitor programmes in areas of potential contamination to assess the concentration level and their bioaccumulation in the trophic chains in the marine and coastal communities.

#### **d) Tourism**

Tourism development is oriented towards the coast and therefore contributes its share to the pollution of the marine environment and to the destruction of coastal areas and their resources. Environmental problems associated with tourism have already been outlined in Chapter 3.

#### **e) Shipping and Marine Activities**

Shipping and marine activities as well as harbour improvement have caused serious damage to marine mammals, benthic community, shellfish beds and mangroves.

Petroleum pollution as a result of oil spillage and emptying of ballast of tankers also adds to the problem of the destruction of the marine resources and the marine habitat.

Accidental oil spills from tankers have occurred along coastal routes used by oil tankers.



Oil spills resulting from shipping and refinery have led to the destruction of the marine and coastal habitat thereby destroying important nursery areas of fishes and other marine species, also increasing the vulnerability of the coastal areas to wave action and hurricane induced storm surges.

X  
The disposal of dredged spoils from harbour improvement has also seriously affected vital fishing grounds.

Marine sediments contain substantial concentration of heavy metals such as copper, cadmium, chromium, lead, zinc and mercury and are damaging to marine species such as shellfish. Due to their potentially toxic characteristics, dredged materials should be tested before being disposed of into the marine environment.

In conclusion, with limited resources, a choice has to be made in terms of the economic activities to be undertaken. For most countries in the Caribbean, the focus is on tourism, fisheries and industrial development and agriculture.

These industries are geared towards the coast and therefore pose serious threats to the marine and coastal resources as well as the environment. As these countries move into the 1990's the increase in development trends will intensify the risks of increased pollution. As already observed in Jamaica there has been increased pollution of important areas, resulting in the destruction of the delicate coastal and marine ecosystem.

#### **4.3.2 Protection and Conservation of the Marine Environment**

Industrial activities, tourism development, urbanisation

and port and shipping activities have all contributed to the pollution of the marine environment. In order to reduce the deleterious effects of these activities on the marine environment, an integrated management system need to be developed, to regulate land based and coastal activities as well as taking into consideration, regional and international activities.

There is an urgent need to implement effective developmental plan to regulate the location of industries. Careless placing of any industry in the coastal zone can have undesirable economic consequences and high ecological costs. Potential threats from industries include dumping of effluents and sewage into coastal waters. The present status of the Kingston Harbour is a good example of the harmful effects of these pollutants.

The new Law of the Sea places a heavy responsibility on states to protect the marine environment. One way of achieving this is by balancing developmental interest with environmental protection.

An important aspect to protecting the marine environment is the awareness of the public to the importance of the environment.

#### **4.3.3 Administrative and Legal Instruments for the Control of Marine Pollution and the Protection of the Marine Environment**

The combined effects of the activities of the marine sector have generated pollution and are potentially damaging to the environment, as there are no adequate pollution control regulations in effect.

As will be outlined in chapter 7, there are some form of legislative instruments covering pollution and the marine environment, but these have not been effective due to the lack of adequate regulations and guidelines and the enforcement of the regulations. Also, marine pollution was not identified as a major problem, due to the lack of awareness of the potential damage to marine ecosystems by coastal developmental activities.

Measures need to be taken to develop anti-pollution legislation and regulations and guidelines, pollution contingency plan and to strengthen the monitoring capabilities of the designated institutions.

Effective management for the control of marine pollution and the protection of the marine environment will require the collection of scientific knowledge of pollutant types, sources, distribution and effects.

#### 4.4 Summary and Conclusion

Jamaica is undergoing serious environmental problems due to pollution from urbanisation, tourism development, agriculture, ports development, and shipping activities within the harbour and neighbouring coastal waters.

Some of the major specific problems are:

- .1. lack of adequate treatment of sewage and effluents disposed of into coastal and inland water bodies by industries and urban centers. This has caused damage to human health and the mangroves and coral reefs;
- .2. oil pollution from shipping activities and from refinery. This is a potential threat to the islands eco-

logical and economic resources.

- .3. the national legislations which cover pollution and the protection of the marine environment are ineffective due to poor enforcement measures and lack of adequate guidelines;and
- .4. agriculture runoff poses serious threat to the marine and coastal resources and the marine environment.

Table 14 shows the relationship of coastal activities on marine resources and coastal development.

In an attempt to maintain the biological diversity and endemism of the coastal and marine areas, emphasis must be placed on the development of protected areas and the protection and management of such resources. There is also a need for an overall integrated coastal area management plan to guide urbanisation and development in the coastal areas.

Also of great importance is effective legislative mechanism for the management of the wetland areas. In this context the Beach Control Act should be updated and enforcement measures put in place. This will however require financial and human resources.

Policies should also be developed relating to the use of pesticides and insecticides and also to cover the treatment of industrial and domestic effluents before they are discharged into water bodies.

A review of all the problems dealt with in previous chapters indicate that there need to be a new approach to

Table 14

The Relationship of coastal activities on marine resources and coastal development

Coastal Activities	Fish Resources	Mangroves	Coral Reef	Seagrasses	Beaches	Estuarine & Lagoons	Fisheries	Agriculture	Forrestry	Mining & NEnergy	Ports & Shipping	Urbanisation	Industry	Tourism
Explosive Fishing	x		x				o							
Mangrove Harvesting	x	x					o		o				o	
Sand Mining			x		x		o					o		o
Coral Mining	x		x				o					o		o
Sewage Discharge	x	x	x	x	x		o					o		o
Factory Discharge	x	x	x	x	x	o	o				o		o	o
Agricultural Waste Discharge	x	x		x		o	o	o						o
Ship Discharge	x	x		x	x		o			n	o		o	o
Shipping Tank Traffic	x	x		x	x		o			n	o			
Oil & Gas Exploration	n	n		n	n		n			n	n			n

Key

- x impact on resources
- o relationship with coastal activities
- n not fully exploited

the development of marine economic activities. This new approach will involve balancing development and environmental protection. This can be achieved by the development of an integrated national marine policy to cover all aspects of development of the marine sector, marine related activities and other activities affecting the marine and coastal resources.

Another important aspect that must be analysed before discussing the methodology of an integrated national marine policy, is the aspects relating to the United Nations Convention on the Law of the Sea.

The extension of coastal jurisdiction will not only create potential benefits, and responsibilities but it also increases the potential for increased conflicts among the many interested users of the ocean resources, ocean space and the coastal areas.

The integrated national marine policy should take into account and cover all existing ocean uses as well as the increased uses that will be applicable under the new regime.

Chapter 5 will look at the the Law of the Sea Convention and its implication for Jamaica.

## CHAPTER 5

### MARITIME JURISDICTIONAL ISSUES

#### 5.1 Introduction

The Third United Nations Convention of the Law of the Sea was adopted in 1982 and was open for signature in Montego Bay, Jamaica in September of the same year. This Convention has created a new legal order affecting the offshore boundaries of coastal states. This new legal regime gives states a number of rights and duties "which may greatly affect the requirements, methods and scope of policy making and management of coastal resources in these countries."<sup>1</sup>

The Convention gives states the legal right to claim a 200 mile Exclusive Economic Zone, and the right to explore the resources of this zone as well as the resources of the continental shelf. The extended jurisdiction creates new resources, new opportunities and challenges for national development.

In the extension of the jurisdiction and the exploitation of the resources, states are subjected to a set of comprehensive international rules, governing the uses of the ocean and their resources. States, therefore, have the ultimate responsibility to translate these rules into their national legislation and to adopt the necessary measures to introduce the marine dimension into their national development.

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<sup>1</sup> UNEP Management and Protection of the Marine and Coastal Environment of the Wider Caribbean and the Convention on the New Law of the Sea. Meeting of Experts on the Caribbean Environment Programme - Mexico City 7-9 September, 1988.

## 5.2 Implications of United Nations Law of the Sea

### Convention to Jamaica

At present, the outer limit of Jamaica's territorial waters is 12 miles from the base line of the island.

Jamaica is presently drafting a bill for the establishment of a 200 mile Exclusive Economic Zone (EEZ). Work on this bill is being done through an inter-agency drafting committee within the Ministry of Foreign Affairs.

The establishment of such a zone, would allow Jamaica to secure all Cays, shoals and banks of long usage that are presently beyond the territorial sea. This will however, require new management responsibilities.

The opportunities to be gained by Jamaica from the extended jurisdiction are however limited, because firstly, there are few known significant resources in the EEZ.<sup>2</sup> Secondly, as a Carib-locked country with Cuba 90 miles to the North, Haiti approximately 100 miles to the East and is flanked by many small islands owned respectively by Honduras, Nicaragua and Columbia; (see figure 14) Jamaica will not be able to claim the maximum extent of a 200 mile zone. However, with regard to delimitation of the boundary, Jamaica will have to establish agreements with Cuba and Haiti with respect to the overlapping claims.

Jamaican fishermen who previously fished near the islands owned by Honduras, Nicaragua and Columbia and to which there were no legal restrictions will be unable to continue fishing in these areas unless an agreement is established between Jamaica and these countries.

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<sup>2</sup> Hyman, Hugh The Common Heritage of Mankind. Concepts in the Law of the Sea. A Third World Perspective, UWI Cave Hill, Barbados, April 1981.



Provisions have been made in the Law of the Sea Convention in relation to land-locked and geographically disadvantaged states.<sup>3</sup>

According to articles 69 & 70 of the Convention, developing land-locked and geographically disadvantaged states may be allowed to participate in the exploitation of the living resources of the EEZ of coastal states of the subregion or region.

Due to its status as geographically disadvantaged Jamaica introduced the concept of the Matrimonial Sea at the "Special Conference of Caribbean Countries Concerning the Problems of the Sea" held in Santo Domingo in 1972.<sup>4</sup>

The proposal was generally to the effect that the resources within the Caribbean Sea, but outside the twelve mile territorial seas of the various territories bordering or within the Caribbean Sea, should be regarded as a sort of common heritage to be shared - explored and exploited, with the accruing benefits allocated to the various territories of the region.<sup>5</sup> This suggestion of a "Matrimonial Sea" arrangement for the Caribbean never received much support either from the conference as a whole or from members of the group of 77.<sup>6</sup>

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<sup>3</sup> See Articles 69 & 70 of UNCLOS 111 (1982)

<sup>4</sup> *supra* n. 2

<sup>5</sup> *ibid.*

<sup>6</sup> Jhabvala, Farrokh (ed) *Maritime Issues in the Caribbean Region. Proceedings of a Conference held at Florida International University April 13, 1981.* University Press of Florida, Miami 1983 pg 5.

It now seems unlikely that it will ever be accepted in light of the number of countries in the region claiming maximum extent of 200 mile zones.

The establishment of the EEZ also requires the development of capabilities with respect to marine scientific research, exploration and exploitation of marine resources, conservation of living resources and fisheries management.

Article 61 of the Convention says that states must ensure that the living resources are not endangered and that proper conservation and management measures are adopted.

Article 192 of the Convention states that all nations have an obligation to protect and preserve the marine environment. Article 212 gives coastal states the right to implement preventive and control measures in the territorial sea, the EEZ and the contiguous zone in order to reduce the pollution of the marine environment.

In this regard, Jamaica is required to establish national laws and regulations to prevent, reduce, and control pollution of the marine environment from dumping and other land-based sources. The laws and regulations for the EEZ should be adopted in conformity with international rules and standards.

Jamaica also has an obligation not to destroy or damage the environment of its neighbours. Articles 208, 210 & 211 say that states have an obligation to ensure that their activities do not injure the health and the environment of neighbouring states. In view of the difficulty of achieving this on a national level,

regional co-operation is recommended.

The Convention says that "states shall take, individually or jointly as appropriate, all measures consistent with the Convention, that are necessary to prevent, reduce and control pollution of the marine environment from any source, using for this purpose the best practicable means at their disposal and in accordance with their capabilities and they shall endeavour to harmonise their policies in this connection".<sup>7</sup>

As a signatory to the Convention, Jamaica will have to adhere to these duties and obligations by developing administrative, regulatory and legislative measures. In terms of regional co-operation, Jamaica is actively involved in some of the regional programmes developed for protecting the Wider Caribbean.

The protection of the marine environment apart from obligatory under the Convention is very important to the Jamaican economy. Tourism which is now the major foreign exchange earner is dependent on the island's natural beauty - clean sandy beaches, clean waters, as well as pure air and abundant sunshine.

The new management responsibilities with respect to the conservation and protection of the living resources and the marine environment implies a review of the country's existing legal and administrative mechanism to ascertain if they can adequately deal with the increased responsibilities.

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<sup>7</sup> Article 194 of the United Nations Convention on the Law of the Sea.

If the review shows that the legislation is not equipped to cover the extended jurisdictions, new legislative instruments will have to be created or the existing ones reformulated. If new laws and regulations are to be developed they must conform with the international rules and standards.

The present legal and administrative framework dealing with the development and management of the coastal and marine resources will be analysed in Chapter 7 with a view to determine whether there should be changes with respect to the new approach to resource development and management.

The review will also determine if institutional changes are required with respect to the management of the EEZ in the areas of fisheries management, coastal zone management, environmental monitoring and surveillance as well as enforcement.

The Convention also imposes additional responsibilities on states regarding maritime transport. In this aspect, Jamaica will have to provide ancilliary services to the shipping industry. This will require the upgrading and improvement of marine pollution control, vessel traffic services systems, hydrographic and pilotage services and lighterage and bouyage.

### **5.3 Enforcement of Maritime Jurisdiction**

If Jamaica is to maximise the use of the limited resources of the offshore jurisdiction, it will have to establish and enforce management regulations. Enforcement requires an effective series of actions which may be very costly and present challenges not normally encountered on

land.

Enforcement involves among other things, the surveillance of sea areas, to detect trespassers and ships releasing ballast and oily residues into the ocean. Surveillance can take two forms, air and sea patrol.

#### 5.3.1 Enforcement Issues

There are a number of maritime activities that are subject to regulations by coastal states. These activities are as follows:

- i) fishing;
- ii) energy and mineral resource exploration and exploitation;
- iii) shipping including illegal activities such as smuggling;
- iv) protection of the ocean environment and;
- v) marine scientific research.

Not all of these activities are presently being undertaken in Jamaica, but the potential for future development exists (marine scientific research and mineral resource exploitation).

Each of the above activities will require surveillance and enforcement at sea. However, some aspects such as the inspection of ships to ensure seaworthiness and the prohibition of the importation of illegal substances can be done in the ports.

#### i) Fishing

With respect to fishing, Article 62 paragraph 2 of the Convention on the Law of the Sea, requires that states

determine the capacity to harvest the living resources of the EEZ. If the coastal state does not have the capacity to harvest the entire allowable catch it shall through agreements or other arrangements, give other states the access to the surplus of allowable catch. Article 70 is particularly relevant to Jamaica as it relates to the rights of geographically disadvantaged states with regard to the resources of the EEZ of such coastal states. In the case of Jamaica, due to the overexploitation and depletion of the fish stock the surveillance and enforcement measures can be simplified as the chance of having illegal foreign fishermen is minimal. However, to rebuild the stock and to maintain the stock over a long term, the enforcement of fishing laws and regulations will have to be intensified.

Information on regulatory strategies for fisheries management will be outlined in Chapter 9 on Policy Recommendations.

#### **ii) Energy and Mineral Resources**

Article 60 of the Convention indicates that coastal states have a responsibility to establish safety zones up to 500 meters in radius around any installation. With the intention of Jamaica to explore oil fields that were discarded by oil majors, the safety zones will have to be enforced. In addition surveillance measures will be required to detect illegal and unsafe drilling practices.

#### **iii) Shipping**

The regulations governing shipping can be divided into three groups:

1. those relating to the action that may be taken from or by vessels in waters over which the coastal states

have jurisdiction;

2. those governing the design, construction, staff employment, equipment and operations of vessels and;
3. those relating to external measures taken to enhance the safety of navigation or to designate the areas in which the vessels may operate.

On the high seas and in the EEZ navigation is free, but within the territorial seas of Jamaica, the rights of the vessels are limited to the rights of "Innocent Passage". This means that vessels must make their passage, inter alia, without delay, and without the threat or use of force against the state.<sup>8</sup>

Prevention of these activities will require successful enforcement and surveillance measures. In this aspect, The Coast Guard, The Marine Police, The Jamaica Defence Force and The Police Force should be provided with adequate patrol vessels and other equipment required for surveillance and enforcement. In addition, the duties and functions of these personnel should be clearly defined in order to reduce conflicts and to prevent jurisdictional overlap.

Enforcement of regulations is also necessary to prevent pollution of the island's coastal waters resulting from the cleaning of tanks and the discharging of ballast and oily residues.

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<sup>8</sup> See Article 19 of the United Nations Law of the Sea Convention.

In terms of the navigational aspects, Article 22 of the Law of the Sea Convention states that coastal states may establish sea-lanes and traffic separation schemes in the territorial seas, for regulating the passage of ships exercising their rights of innocent passage.

Domestic laws covering immigration, sanitation and smuggling will have to be strictly enforced.

Enforcement of laws and regulations governing shipping requires surveillance of waters under national jurisdiction that are frequently visited by foreign vessels.

#### iv) Protection of the Ocean Environment

Articles 212 -222 are concerned with the enforcement of regulations designed to reduce and control pollution.

Articles 223 -233 prescribe various safeguards that must be obeyed in carrying out enforcement procedures.

The detection of pollution from shipboard sources requires a patrol effort. Deliberate offshore dumping of refuse, dredge spoils or other materials that may be authorised by permit should be monitored during the operation to ensure that regulations are met. However, due to its size, this may be a very difficult and expensive task to be undertaken nationally. This can however be undertaken on a regional level.

#### 5.4 Summary and Conclusion

The extent of marine sectorial problems, environmental problems and the implication of the United Nations Convention on the Law of the Sea require a new approach towards coastal and marine resources development. This approach as already indicated must take the form of an



integrated management system covered by an integrated national marine policy. In order to establish an integrated national marine policy, it is important to understand the concept of a marine policy and of an integrated marine policy. Chapter 6 will outline the methodological framework of an integrated marine policy.

## CHAPTER 6

### THE METHODOLOGICAL FRAMEWORK OF AN INTEGRATED NATIONAL MARINE POLICY

#### 6.1 Conceptual Framework

A policy may generally be defined as " a set of guiding principles or procedures designed to influence the actions and decisions of individuals or groups."<sup>1</sup>

Policies are therefore created to guide, initiate or constrain the actions of individuals or groups. The absence of a policy generally leads to lack of direction in terms of overall coherent growth and development.

Various concepts have been used by institutions and countries to describe the development and management of the ocean resources and its space. The concepts are generally described as "Ocean Policy" (University of Sea-Use Planning " (The Netherlands) "Ocean Management in Europe" (Norway) "Ocean Law, Policy and Management" (Dalhousie University Canada) "Sea Use: Law, Economics and Policy Making" (LSE London)<sup>2</sup>

These variegated terminologies are however geared to a common objective: that of developing (exploiting) and managing (conserving) the resources of the ocean, as well as the resources of the coastal areas, in terms of sustainable development which ensures the availability of resources for the future.

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<sup>1</sup> Levy, Jean Pierre, Towards an integrated, marine policy in developing countries. (Marine Policy 1988 Butterworth & Co )

<sup>2</sup> Watt, D. C. Integrating Policy for Ocean Teaching in the University World. (Marine Policy - January 1980.)

The overall goal of marine policy apart from focusing on the exploitation and management of the resources within sustainable limits, should also take into consideration all other activities interacting or impacting upon the marine environment and the coastal areas.

The exploitation of marine resources requires careful planning and management in order to avoid depletion of resources. The absence of an effective management regime in Jamaica and other countries is reflected in the serious problems being encountered with regard to the deterioration of the marine environment and also the depletion of the resources on which development depends. Consequently, future policies to be developed should cover a wide range of issues, such as the effective and optimum use of resources, protection and preservation of the marine and coastal resources as well as the protection of the marine environment. The policies should also take into consideration the present and future uses.

As more and more countries move into rapid economic growth and development, the traditional natural resources on which the development is based are rapidly being depleted. New areas are being identified, and, during recent years, interests have been increasingly directed to the ocean as a source of food, minerals, energy, as a transport medium for global trade, as a stimulus for employment, as a locale for esthetic joys and recreation and as a link in foreign relations.<sup>3</sup>

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<sup>3</sup> Wenk, Edward Jr. A Challenge for the Future. A Global Principle for National Marine Policy. Comparative Marine Policy - Centre for Ocean Management Studies, University of Rhode Island, Praeger 1981.

In light of the existing and potential competing and complementary uses of the resources and coastal areas, an integrated marine policy is needed to minimise the conflicts and to allow for the co-existence of interested users of the coastal areas and the coastal and marine resources.

The United Nations Law of the Sea Convention 1982, which serves as a legal framework within which nations are able to establish a 200 mile Exclusive Economic Zone (EEZ), further reinforces the urgent need for countries to develop an integrated marine policy. The Convention gives countries the right and authority to extend their coastal boundaries and to conserve and manage the living resources within these boundaries. The Convention also indicates that states have an obligation to preserve and protect the marine environment.<sup>4</sup>

The Convention although not yet in force will bring certain benefits as well as numerous responsibilities.

In order to implement the Convention, countries will have to incorporate Convention rules and regulations in their national legislations.

## 6.2 Changing Uses and Policies

Traditionally, the ocean was used mainly for shipping and fishing, but as countries strove for economic development and marine technology advanced, more and more uses were made of the ocean: offshore oil and gas exploration, energy research, mineral extraction, waste disposal, recreation and esthetic joy.

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<sup>4</sup> See Article 145 of UNCLOS.

In light of the changing and additional uses of the ocean, when developing marine policies, countries should take into account the long term and short term effects. Policies developed for short term gains and benefits usually have long term implications which may have high economic, social and ecological costs to the society.<sup>5</sup> Situated in a world which is continuously changing requires looking beyond the present, thus, consideration for the future should be incorporated into the policy planning process in order to take into account any possible changes which may occur.

Accepting and integrating marine policy into government's national and economic development plan is a positive step towards sustainable development. In order for states to make the best use of their ocean space and resources, the concept of marine policy must be understood, accepted and integrated into the broader national economic plans by the political directorates and planners.

The exploitation of any natural resources requires careful management, planning and implementation if the resources are to be utilised and exploited for the present and future generation.

The concept of sustainable development is now of great concern as countries have realised that their natural resources, marine and terrestrial are being depleted at a very rapid rate.

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<sup>5</sup> supra n. 3

To obtain long term benefits and to achieve sustainable development of the resources of the ocean " public and private enterprise must be encouraged to determine the full resource potential of the sea as well as the most effective means of extraction of food, mineral and energy without depletion of the basic capital of a planetary inheritance".<sup>6</sup>

In this regard, resource management should look beyond the level of economic efficiency and consider the social and environmental impact on the society. The interdependence of ocean policy and land base policy should also be taken into consideration.

### 6.3 Requirements of Integrated National Marine Policy

One of the basic requirements for the development of a national marine policy is the political will and commitment to preserve the coastal and marine resources and the marine environment. It is now recognised worldwide that an integrated management system is absolutely necessary if the resources are to be utilised for the present and future generation.

For the development of a policy the government will first need to establish the objectives of the policy. These objectives should however be developed in collaboration with the overall economic developmental objectives. These objectives will also have to be prioritised in view of the limitation of resources: natural, financial and human.

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<sup>6</sup> supra n. 3

Due to the limitation of resources the policy formulation should include all relevant and interested parties in order to reduce the social and political conflicts which may arise.

#### 6.3.1 Information and Data

The acquisition and analysis of data are necessary for the development of a marine policy. Acquiring the data will involve a complete survey and evaluation of the resources. The information gathered should include the marine environment, the existing and potential uses of the coastal areas and their resources. In this regard, the physical, geographical characteristics of intended activities as well as technical, economic and social conditions that might affect performance should also be covered.

The continuous collection of data is necessary because firstly, the information will be required in the initial decision making process and also in the evaluation of the effectiveness and usefulness of such decision for the formulation of the policy and the adjustment of the strategy chosen. Reliable and comprehensive information contributes to better decision.

The lack of adequate and up-to-date information can contribute to the deterioration of the natural resources due to over-exploitation.

Critical therefore to the careful management of the natural resources, coastal as well as land based, is the systematic collection, documentation, and analysis of information and data in order to determine trends, iden-

tify problems, formulate plans, make decisions and monitor the implementation of projects.

In most countries surveying, collection and evaluation of data are carried out by different government agencies, research institutions and by other interested parties, like non-governmental organisations. All this information should be presented in an integrated and coherent manner and disseminated to all pertinent users whether government agencies or private organisations.

This task can be undertaken by a planning and co-ordinating body to incorporate all the sectoral information inputs into a cohesive and comprehensive framework. With the information in hand, planning of the coastal area and the resources can be undertaken, with the interaction of the various marine activities and sectors taken into consideration.

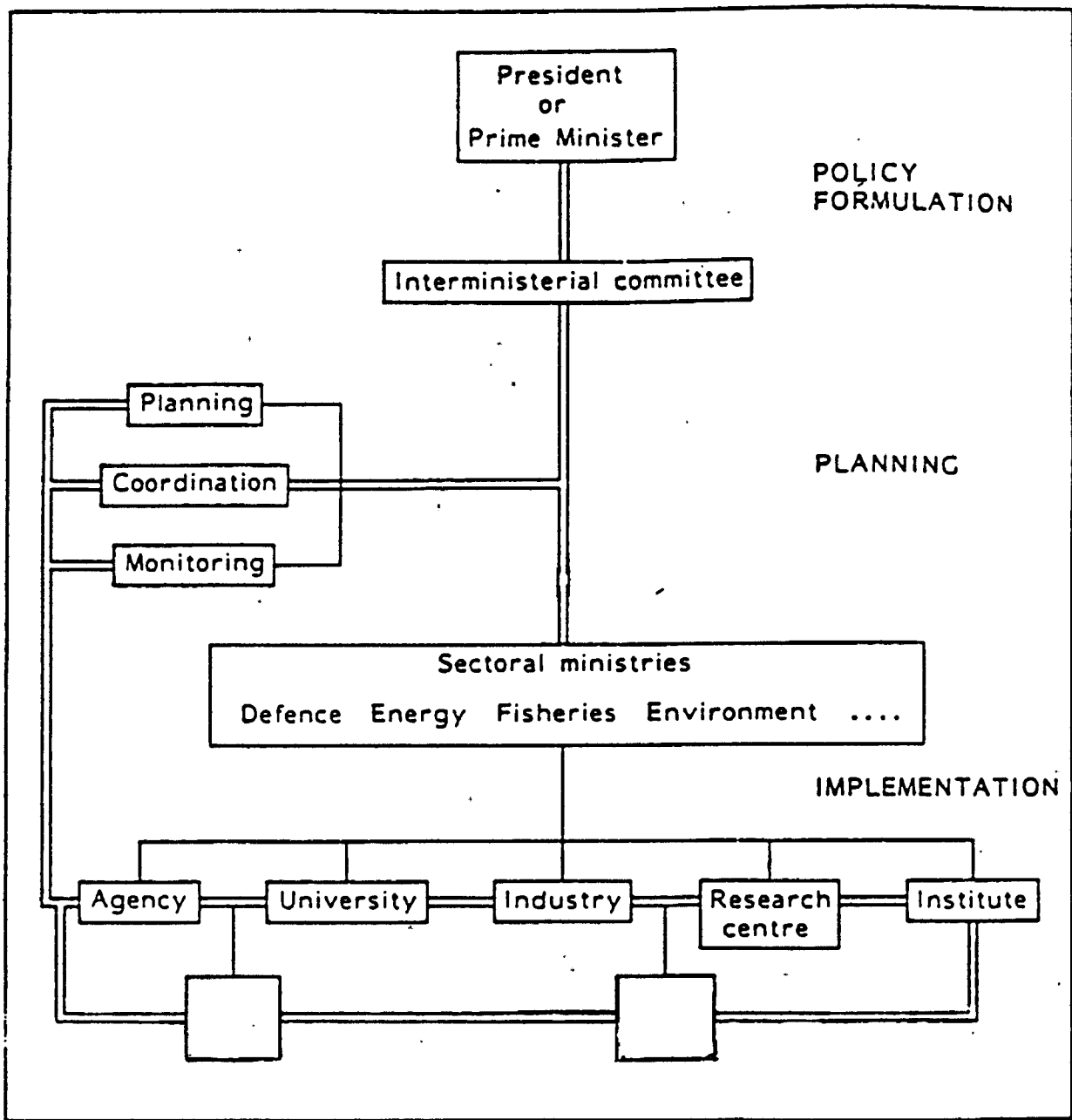
#### **6.4 Institutional Infrastructure**

The establishment of a national integrated marine policy also requires a planning and co-ordinating body to formulate and implement the necessary plans and to ensure co-ordination among agencies with marine related activities. (see chart 1) This institution should also be responsible for regulating the activities of the marine sector. The establishment of the policy also requires a decision making body to take policy decisions. In some cases the planning and co-ordinating body is responsible for policy decisions, while in others this is undertaken by a separate body. Whatever method adopted policy decisions should be taken at the highest level and should be included in the government's national development plan.



CHART 1

Structure involving an inter-ministerial committee to coherently implement a national marine policy



Source Levy, Jean-Pierre Towards an integrated marine policy in developing countries. Marine Policy 1988 Butterworth and Co. (Publishers Ltd.)

The planning and co-ordinating body should also be equipped to provide recommendations, alternatives and evaluations based on cost benefit analyses.

Policy decisions also need an administrative mechanism for translating the policy into appropriate legislation and guidelines. Policy decisions must be enforced and in this aspect, the institutions responsible for enforcement of legislation and regulations should be provided with the necessary tools to perform its tasks, effectively and efficiently.

### 6.5 Formulation of a Marine Policy

There are some very important issues that a marine policy should address such as the question of how and what resources and related resources to be managed should be adequately covered by a marine policy. The institutional regime for the development of policies, planning and management of marine and coastal resources, and the regulation of activities should also be taken into consideration.

In the formulation of an integrated marine policy all interested users of the ocean resources and the ocean space should be drawn into the picture. This is necessary to avoid conflicts among the users.

It is also important to know how other countries formulate and implement their foreign policy.

The basic requirements for the formulation of a national marine policy can be summarised as follows:

1. formulation of marine policy should involve wide range consultation with citizens, groups, business

- groups and other interested parties;<sup>7</sup>
- .2. marine policy should be clearly defined in a simple, comprehensible and intelligible manner;<sup>8</sup>
  - .3. marine policy should be logically consistent and economically sound;<sup>9</sup>
  - .4. marine policy should form an integral part of a country's overall strategy for the achievement of national objectives;
  - .5. marine policy has to set out the priorities and be translated through appropriate administrative mechanisms into specific projects preferably complementary but at least not in conflict with each other;<sup>10</sup>
  6. marine policy must be translated into practical application through appropriate legislation and implementation mechanisms.

## 6.6 Policy Implementation

### Project Development and Financing

Once the policy has been formulated and adopted, it must be translated by projects and programmes. Projects are widely recognised as the principal instruments of plan implementation. Due to the limitation of natural, human and financial resources, it is important to identify and select projects that are able to fulfil the desired objectives. These projects will also have to be prioritised.

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<sup>7</sup> supra n. 1

<sup>8</sup> *ibid.*

<sup>9</sup> Coastal Area Management and Development. UN Department of International Economic and Social Affairs and Ocean Economics and Technical Branch 1982, New York Pergamon.

<sup>10</sup> supra n 1.

The development of projects and programmes will require inputs such as equipment and facilities, services, manpower and capital. This can be provided through international organisations such as The World Bank, IDB, OAS, UNDP, CIDA, ICOD, USAID, IMO, FAO UNEP and other UN related organisations

In the implementation, it is important to select among the possible alternatives the ways and means to implement the policy.

#### **6. 7 Monitoring and Evaluation**

The monitoring of project implementation is very important for a number of reasons. Firstly, monitoring is necessary to ensure that the objectives of the projects are being achieved. Secondly, this will allow for the redefinition of policy to take in economic, technical or social changes which may occur.

#### **6.8 The Role of Marine Policy in National Development.**

Development can be seen as a process that attempts to improve human welfare. It is the aim of government to establish the process whereby people can obtain the means to improve their welfare as well as that of their offspring. Government, therefore, has the ultimate responsibility of using the available resources to ensure that the basic needs of the population are met.

The natural resources of the terrestrial and marine environment are the resource base on which development depends. Consequently, the environment can be considered to be an integral part of development since any impact on man's environment also influences his state of well-being

or welfare. In view of the inevitable link between the environment and development, it is very important that countries pay special attention to the environment as it is their resource base and life supporting system.

Marine and coastal resources can make a significant contribution to attaining a wide range of national objectives including a growing and stable environment, increase in employment opportunities, diversification of industries, increased national security and a level of economic independence. A Marine policy can therefore be viewed as a means towards achieving these ends.

In view of the importance of the marine and coastal resources in economic development, the policy for marine and coastal resource development must be consistent with the national development policy. The national development policy should also take into consideration technological policies relevant to the exploitation and development of the marine and coastal resources.

With the many problems being faced by developing countries of increasing population, depletion of land based resources, food shortage, famine and soil erosion, there is clearly a greater move towards the development of the resources of the coastal seas, territorial seas, archipelagic seas and the EEZ for enhanced economic development and economic growth. This growing strategic importance of marine and coastal resources for national development requires a more comprehensive and holistic approach to the development of marine and economic policies. This holistic approach is also necessary in light of the scarce financial, technological and human resources being faced by developing countries.

faced by developing countries.

In developing the resources of the marine environment, the concept of sustainable development should be always at the forefront, so that the resources may be exploited to the benefit of the present and future generations. The sustainable development of the marine and coastal resources will also need a comprehensive plan of action consisting of long term goals supported by well defined policies and objectives.

#### 6.9 Summary and Conclusion

Understanding the concept of marine policy is the first step towards the establishment of such a policy. The concept must be understood by policy makers, planners, and the general public. The marine policy should be integrated into the government's national plan, so as to ensure the effective development and management of the natural resources.

Having looked at the concept and methodology of an integrated marine policy, the following chapter will analyse marine policy in Jamaica. This is to identify if the existing marine policy framework is effective and can accommodate the changes that are occurring with respect to the increase in economic development and the obligations and rights of the United Nations Law of the Sea Convention.

## CHAPTER 7

### MARINE POLICY IN JAMAICA ✓

#### 7.1 Introduction

Having looked at the methodological framework of an integrated marine policy, this chapter will address and analyse the policies of Jamaica which cover coastal and marine resources development. The areas to be dealt with are the administrative and legislative framework of coastal and resource management, and the international treaties and regional conventions which relate to the development and management of coastal areas and ocean uses and which have been ratified by Jamaica. This analysis will assist in the formulation of the recommended policies which will be outlined in chapter 9.

#### 7.2 Historical Development

Legislations and institutions are important instruments for the implementation of policies and their corresponding regulations and guidelines.

Marine policy in Jamaica can therefore be viewed in terms of the various laws enacted, and the institutions established to deal directly or indirectly with marine and coastal resources development and management, and the development and control of the coastal areas.

The first legal background to environmental consciousness was the enactment of the Harbours Act in 1874. The Act was established to address, inter alia, the problems of marine pollution.

In looking at the background to marine policy and the creation of various legal and administrative mechanisms

to deal with the development and management of the coastal and marine resources, three periods have been identified.

These are the pre-independence period (1870 -1960), the independence period (1960-1969) and the post independence period (1970-1979)

#### **Pre-independence (1870 -1960)**

During the pre-independence period of 1870-1960 responsibility for the development and management of coastal resources was carried out on behalf of the Crown by various government and statutory organizations. The emphasis was on the exploitation of the resources. The legislations covering environmental issues which evolved during this period were The Town and Communities Act (1843), The Harbours Act (1874), The Forest Act 1937 The Black River (Upper Morass Reclamation) Act (1941) The Mining Act (1944), Wildlife Protection Act (1945) Beach Control Act (1956) The Flood Water Control Act (1958), The Water Supply Act (1958) and The Town and Country Planning Act (1958).

#### **Independence (1960-1969)**

After the island got its independence in 1962, environmental management was shifted from resource exploitation to resource enhancement. New legislations and institutions were also created during this period to address marine and coastal and related issues. These were The Underground Water Control Act (1962) and The Watershed Protection Act 1960.

#### **Post Independence (1970-1979)**

The major addition to the legislative framework in the 1970's includes the Port Authority Act (1972), the



Revised Public Health Act (1974) and The Fishing Industry Act (1976).

The post independence era also marked a very significant period in the history of environmental management. This period, highlighted by three major events was the beginning of a co-ordinated approach to the management of natural resources.

The Stockholm Conference on Human Environment in 1972, the establishment of the Ministry of Mining and Natural Resources in 1974; and the proposal to site a major petrochemical complex in Jamaica in 1971 were the three main events.

The 1972 Stockholm Conference on Human Environment created national as well as international awareness to the need for significant legal changes to environmental conservation and management.

Jamaica was among the many countries represented at the conference that played a very important role in establishing a worldwide mandate for environmental management.

As a result of its commitment at the conference and as part of the strategy for conservation of natural resources and in its attempt to develop a coordinated approach to environmental management, the Government established the Ministry of Mining and Natural Resources in 1974. The Ministry was responsible for mineral resource mining, geological mapping and mineral resource exploration, development and conservation of water resources, distribution of water and land planning and registration.

The Ministry was also responsible for the existing bodies having environmental responsibilities. These bodies were

the Beach Control Authority, Kingston Harbour Monitoring Committee, Department of Public Recreational Facilities, National Parks and Wildlife Committee, Scientific Research Council, and the Seismographic Research Unit.

The proposal by a US developer in 1974 to site an industrial development complex in Jamaica was the third event which sparked a concerted effort towards the development of a co-ordinated approach to environmental management.

The complex consisted of a refinery, a marine terminal and trans-shipment port, a dry cargo pier, power station, caustic and chlorine plant, ethylene storage and a water treatment plant.

These events laid the foundation for the creation of the Natural Resources Conservation Department (NRCD) in 1974 and the Environmental Control Division (ECD) in 1975.

In 1975, a Natural Resources Conservation Authority (NRCA) was established to direct the workings of NRCD. This department was intended to unify the existing bodies such as the Beach Control Authority (BCA), the Watershed Protection Commission, the Wildlife Protection Committee, the Natural Resources Planning Unit, the Marine Authority Committee and the Kingston Harbour Water Quality and Monitoring Committee. The Department was also given the functions pertaining to ecological research and natural area management such as terrestrial and marine parks.

The Stockholm Conference and the commitment to sound environmental management coupled with the development of legal and administrative instruments laid the foundation for the development of a national environmental policy. However, overcome by economic events and problems, in the mid 1970's when the country experienced severe fiscal problems, with years of economic decline, due to rapid price increase in the price of oil, and stagnating productivity in most sectors, the movement towards a coordinated approach to environmental management lost its momentum.

Faced with this situation the government focused its attention on a structural adjustment programme geared towards achieving sustainable economic growth.

Emphasis was placed mainly on the development of economic policies with very little regard for the impact of development on the environment.

### 7.3 Identification of Marine Policy in Jamaica

Presently there is no formal comprehensive national environmental policy covering ocean uses, resources and the protection of the marine environment. However, inspite of the absence of a comprehensive and stated national marine policy, a review of the legal and administrative regime as well as the ratification of international and regional conventions and affiliations to regional organisations dealing with marine and coastal questions showed elements of marine policy. These relate to coastal resources protection and management, marine pollution and marine environmental protection, ports and harbours, and development and control of the coastal areas.

### 7.3.1 Coastal Area Resources, Protection and Management

The coastal area resources of the island include mangrove forests or swamps, coral reefs, wetlands, sand, beaches, Cays, fish and other wildlife, energy and minerals. The protection and management of some of these coastal area resources are addressed by a number of legislations and regulations.

The Beach Control Act prohibits activities such as waste disposal, dredging and coral reef removal from protected areas. The Act also lays down regulations pertaining to the designation of protected areas, the construction of docks, wharves, and piers. The Act also declares public beaches.

The Wildlife Protection Act (1973) is the most important law affecting the management of wildlife resources. This Act prohibits the removal of turtle eggs, the use of dynamite or explosives or noxious materials to kill or injure fish. The exploitation and exploration of fisheries is contained in the Fisheries Industry

Act (1975). The Act relates to the licensing and registration of fishing boats as well as the protection and conservation of fish stock of Jamaican waters by establishing closed seasons. The Act also provides for the creation of fish sanctuaries and penalties for landing and sale of illegally caught fish.

The Harbour Act prohibits the removal of articles such as sand and gravel from reefs, shoals and cays.

The Morant and Pedro Cays Act prohibits the slaying or capture of birds, turtles and the removal of turtle

eggs without a license.

The Marine Board Act (1985) requires licensing of all motorised vessels and operators of such vessels and designates recreational areas along the coastline and types of activities allowed in these areas.

Also relevant is the Petroleum Act, which gives the PCJ exclusive rights to explore and develop petroleum resources in a manner which will not have adverse effect on the marine environment. Other important acts are the Town and Country Planning Act, the Local Improvement Act, the Urban Development Act, the National Heritage Act, the Port Authority Act and the Quarries Control Act. (see Annex A)

#### 7.3.2 Marine Pollution and the Protection of the Marine Environment

Fisheries are among the most important living resources whose exploitation has the potential to lead to marine pollution. There have been numerous cases where it has been reported that fishermen have used explosives and poisonous substances to stun fishes thereby making them much easier to catch. The prohibition of the use of harmful substances is regulated by the Fishing Industry Act and by the Wildlife Protection Act.

Industrial and commercial developments have created marine pollution of an aesthetic nature as well as by disturbing the equilibrium of the marine ecosystem. The prohibition of discharge of effluents or industrial wastes from any factory into harbours, lagoons, estuaries and streams is contained in the Wildlife Protection Act.

In terms of marine pollution arising from shipping activities, the Harbour Act prohibits the discharge of certain materials including ballast, mud, oil and oily residues into the harbour and ship channels.

Port development also has the potential to lead to marine pollution of various kinds. Debris and other materials from dredging have affected the marine resources and the marine environment. The operation of a port may itself create marine pollution with oil being spilt during loading, discharge or transfer. The operation of the ports in Jamaica is vested in the Port Authority of Jamaica by the Port Authority Act. Under this Act, the Marine Division of the Port Authority of Jamaica (PAJ) regulates and approves the construction of structures on or over waters.

With respect to the exploration, exploitation, and development of petroleum resources, and the protection of the marine environment, the Petroleum Act stipulates that such activities should be undertaken with minimum effects on the marine environment.

The Carriage of Dangerous Goods Act deals with the loading, discharging and handling of dangerous goods within the limits of the ports.

#### 7.3.3 Marine Parks

The Beach Control Act enforces regulations pertaining to the creation of marine protected areas.

#### 7.3.4 Development and Control of the Coastal Area

Coastal area development is regulated by the Town and Country Planning Act, the Local Improvement Act and

the Urban Development Act. The Town and Country Planning Act regulates the control and development of land. Under the Urban Development Act the Urban Development Corporation has authority to acquire, manage and dispose of land within designated areas and to act as sole planning authority within those areas "designated".

### 7.3 5 Water Resources

The Watershed Protection Act 1963 designates watershed areas, and grants access rights to officers for site inspection and erosion control measures. Other related Acts are: The Underground Water Control Act 1959, Water Act 1972, The National Water Commission Act 1980 and The Public Health Act 1974.

(Information on the Acts is given in Annex A )

### 7.4 Existing Institutional Framework.

Responsibility for environmental management lies with a number of ministries, agencies and institutions. These include resource management institutions such as the Town and Country Planning Authority, the Town and Country Planning Department, Urban Development Corporation (UDC) and the Natural Resources Conservation Division.

Other agencies are involved in the educational and financial aspects of environmental management. A summary of the ministries and agencies involved in environmental management are enumerated below.

The key regulatory and management agencies are:

1. Natural Resources Conservation Division - Ministry of Agriculture (now under the new Ministry of Develop-

ment, Planning and Production).

- .2. Environmental Control Division of the Ministry of Health.
- .3. Town and Country Planning Department and the Town and Country Planning Authority of the Ministry of Finance. (now under the Ministry of Development, Planning and Production)

The agencies responsible for economic planning and investment are the:

- Planning Institute of Jamaica (PIOJ).
- Urban Development Corporation (UDC).
- Petroleum Corporation of Jamaica (PCJ).
- Jamaica National Investment Promotions Ltd (JNIP).
- Jamaica Industrial Development Corporation (JIDC).
- Jamaica Tourist Board (JTB).
- Agro 21.

Agencies responsible for coastal resources development and protection include:

- The Fisheries Division - Ministry of Agriculture.
- Ministry of Mining, Energy and Tourism - Energy Division and the Mines and Quarries Division (MQD).
- The Petroleum Corporation of Jamaica.
- Ministry of Local Government.
- Port Authority of Jamaica (PAJ).
- Underground Water Authority (UWA)

Non-governmental organizations(NGO's)and research institutions which are also involved are:

- Institute of Jamaica - Natural History Society of



Jamaica (NHSJ).

- Jamaica Junior Naturalist (JJN).
- Scientific Research Council (SRC).
- University of the West Indies (UWI).
- Entity.
- Goose Bird Club.
- Jamaica Society of Scientists and Technologist
- The Jamaican Geographical Society.
- The Geological Society of Jamaica .
- The Jamaica Conservation and Development Trust (JCDD).

Other agencies with environmentally related activities are:

- The Survey Department - Ministry of Agriculture.
- Beach Control Authority (BCA).
- Jamaica National Heritage Trust (JNHT).
- National Council on Libraries, Archives and Documentation Center (NACOLADS).
- The Jamaica Tourist Board (JTB).
- Office of Disaster Preparedness (ODP).
- Ministry of Construction.

Table 15 gives a summary of some of the environmental agencies functions and responsibilities. Functional descriptions of these Agencies (as given in the Country Environmental Profile) are given in Annex B.

The chart below depicts the organizational structure of environmental management up to February 1989. With the advent of the new government and the creation of the Ministry of Development, Planning and Production, this structure has changed. Some of the agencies and departments such as the Natural Resources Conservation Division

TABLE 15

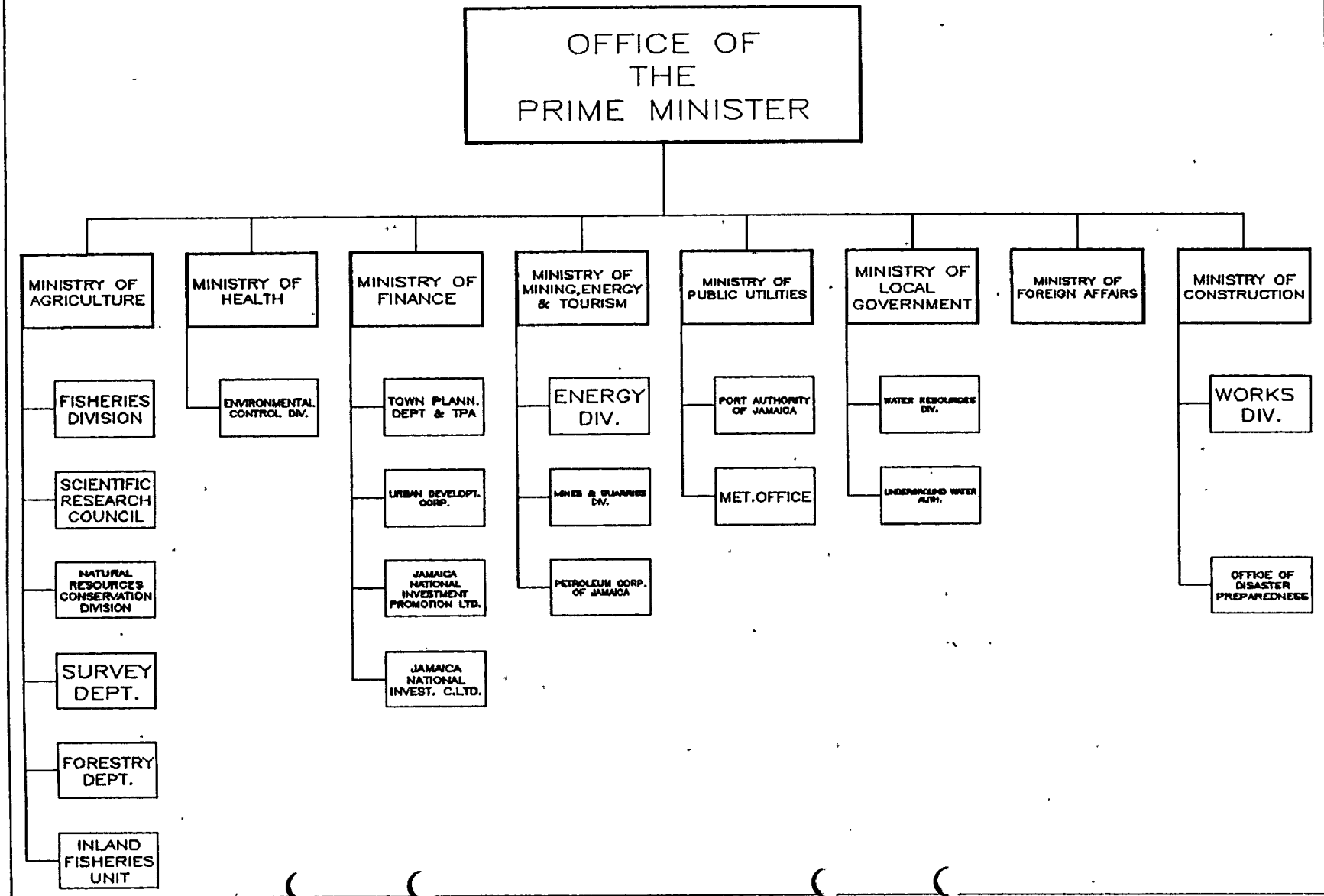
## Environmental Agencies: Functions and Responsibilities

AGENCY	PHYSICAL ENVIRONMENT									BIOLOGICAL ENVIRONMENT					SOCIAL ENVIRONMENT					
	Agricultural Lands	Soil/Coastal Erosion	Energy Minerals	Surface Water Quality	Ground Water Quality	Ground Water Quantity	Air Quality	Noise	Environmental Hazards	Aquatic Ecosystems	Wetland Ecosystems	Terrestrial Ecosystems	Endangered Species	Disease Vectors	Public Health	Urbanization	Resource Land Use	Recreation	Historical Architect. Sig.	At Risk Populations
Natural Resources Conservation Dept. (MDPP)		L	M	M	M		M	M		L M E	L M E	L M E	L M E				I L M	I L		
Environmental Control Division (MOH)				L M	M		M	M						M L	L M F		M			
Town Planning/Department (MDPP)	L		L						L	M	M	M				L P M	L P M	L P M	L P M	L P M
Office of Disaster Preparedness (MLG)									P M						P M	M	M		M	
National Water Commission (MPUT)				M		I									L P M					
Underground Water Authority (MINAG)				M	M	M P														
Commissioner of Mines & Quarries (M/M&E)		LP ME	LP ME													M E L				
Forest Department (MINAG)	LP ME											LP ME					L P M			
Parish Councils (M/LG)									M						L P E	L P M	LP ME			M
Urban Development Corp. (MDPP)																L P M	L P M	L P M	L P M	L P M

Legislation - L  
 Planning - P  
 Implementation - I  
 Monitoring - M  
 Evaluation - E

CHART 2

# SECTORIAL APPROACH TO ENVIRONMENTAL MANAGEMENT



and the Town Planning Department which were originally under the Ministry of Agriculture and the Ministry of Finance respectively have now been transferred to the New Ministry. This new Ministry is now responsible for national planning and for co-ordinating environmental management. A chart reflecting the changes will be presented in chapter 9.

## **7.5 Analysis of Legislative and Institutional Structure**

As shown above, there are a number of legislations and institutions covering marine and coastal affairs. Despite these numerous legal and administrative mechanisms Jamaica continues to be plagued by serious coastal and marine environmental problems such as deforestation resulting in the destruction of mangroves and coral reef ecosystems, pollution from liquid and solid wastes, shore line erosion due to beach destruction and depletion of fish stock.

Some of these environmental problems being encountered relate to a number of structural issues which retard the effective development and management of the coastal areas, their resources and the marine environment. These are: institutional weaknesses, lack of up-to-date national policies and land use plan, lack of baseline data and comprehensive information base, lack of EIA capability and standards and lack of environmental awareness.

### **7.5.1 Legislative Issues and Problems**

Although a coordinated and systematic approach to environmental management was initiated in the early 1970's the legal regime covering coastal and marine issues still

remains fragmented and disintegrated with no single comprehensive act.

Policies covering a number of areas are lacking. For example, there is no national policy for designating protected areas, and for environmental education. There is also no legislation which stipulates that EIA must be undertaken for any particular type of project.

The success of the existing legislations has been severely retarded by:

- a) lack of guidelines and regulations;
- b) absence of public awareness and public education; and
- c) the inadequacy of human and financial resources.

These problems have helped to reduce the effectiveness of coastal zone management in Jamaica.

Enforcement of legislations and regulations is another serious problem of Jamaica. One notable example is the illegal practice used for catching fish in some areas. This practice is allowed to continue because no measure has been taken to resolve the problem.

In addition, penalties imposed for contravention of these laws are usually weak. Fines imposed for the violation of the legal system are minimal and represent very little deterrence to the continued abuse of coastal resources and the marine environment. For example, breaches of the Wildlife Protection Act are subject to fines of only 100 Jamaican dollars.

The penalties imposed by legislation dealing with pollution prevention are also not strict and do not provide a good deterrence to pollution activities. These fines should reflect the degree of damage done and should be imposed not only on vessels, but also on industries responsible for discharging sewage and waste into the coastal and inland waters.

In light of the above analysis, some of the legislation of the island need to be updated and revised with increases in penalties for repeated violations.

However, in order for the government to catch the violators, it will have to implement effective enforcement measures and formulate programmes to ensure that they are adhered to.

The success of laws, regulations and guidelines will depend on the participation and involvement of the public. This will require firstly, public acceptance of the legislations and regulations. Public acceptance is not possible without public awareness, therefore it is very important that measures are adopted to inform the public. This can be done through the media, publications, workshops, schools, universities and by other means.

The public need to be aware of the ecological factors that contribute to the island's economic system and of the limitation of the natural resources. The Jamaican coastal resources which include fisheries, beaches, sand and gravel, as well as the location of scenic and cultural interests, estuaries, wetlands, marine grass beds, coral reefs and other marine organisms are suffering severely from the damage of population pressure and

industrial and commercial development and exploitation of resources.

In light of these problems, an integrated management system needs to be developed with public input and acceptance.

Over the years, especially in the mid 70's and 80's, all development thrust in the island was conceived in terms of structural adjustment for economic advancement without realising that the environment and development are intricately linked. This is manifested not only in the absence of a national environmental policy, but also in the low status of financing of agencies with coastal and marine issues.

The absence of a national marine policy is also due to the lack of awareness of the potential damage to the marine ecosystem by coastal development activities.

To continue the exploitation of resources and to maintain sustainable development of these resources, the many pieces of legislation need to be integrated and centralized.

#### 7.5.2 Administrative Issues and Problems

The effectiveness of legislative measures largely depends on the administrative machinery for their implementation. The best policy and legislation will fail if the administrative structure does not have the necessary resources.

Environmental management is presently effected through several related agencies whose functions impact on the environment, viz the Beach Control Authority (BCA), Fisheries Division, Town Planning Department (TPD),

Environmental Control Division and the Natural Resources Conservation Division.

The division of responsibility for environmental matters among these agencies and ministries results in an unco-ordinated, and in some cases conflicting approach to environmental management. For example jurisdiction over pesticide uses resides with the Ministry of Health, yet it is the Ministry of Agriculture which is most directly involved. The present problems of lack of, and poor co-ordination among these ministries and agencies dealing with coastal and marine matters, jurisdictional overlaps and duplication of functions reinforce the need for an integrated approach to environmental management.

One of the major impediments to the appropriate management of the marine and coastal resources in Jamaica has been the lack of sufficient human and financial resources in environmental agencies and institutions. The lack of resources make monitoring and enforcement of legislation difficult.

The Natural Resources Conservation Division which was originally created to co-ordinate environmental management and was designated as the national focal point for environmental management has been faced with a number of problems. Among the problems is the lack of adequate finances to attract and keep highly qualified personnel.

Another problem is the lack of political will and commitment to environmental management which is evident in the relatively low status given to environmental agencies. For example NRCD which was created to be the national focal point for environmental management has been down-



graded and has shifted between Ministries several times in recent years, thus hindering its ability to establish a firm leadership role in resource management. In addition, because of its status NRCD has had little influence on the action of other agencies whose activities have environmental impact.

NRCD and other agencies responsible for environmental protection like Fisheries Division and the Environmental Control Division have been subordinate to other agencies within the Ministry of Agriculture, and the Ministry of Health respectively, whose interests focus on other areas, hence environmental considerations are relegated to secondary status.

Also, due to measures imposed on the Government for restructuring of external debt, government expenditure has been concentrated on sectors in which result can be seen in terms of dollars and cents to repay national debt. This has resulted in the continued undermining of some agencies and institutions (such as Scientific Research Council (SRC) and NRCD) being understaffed, under budgeted and with severe limited resources to implement programmes.

Planning and co-ordination at the national level for resource development is also lacking.

Although coastal zone management units have been delineated according to parish boundaries (see figure 6) there is an overcentralization of the institutions and agencies dealing with marine and coastal matters. Most of these agencies are located in the capital Kingston, and therefore where specific problems occur, decision making

bodies are far removed. In addition, the overcentralisation makes enforcement of legislations all over the country very difficult. Only well organised and decentralized agencies with adequate manpower and financing will be able to effectively implement and enforce the legislative instruments.

Non-governmental organizations such as those mentioned previously play a very important role in public education and awareness of environmental matters. However, there is no formal interaction between the government agencies with responsibilities for environmental protection and natural resources conservation on the one hand and the NGO's on the other.

#### 7.6 Initiatives in 1989

An attempt to deal with the environmental problems has resulted in the creation of a new ministry in 1989. With the change of government in February 1989, the Ministry of Development, Planning and Production was created. The overall responsibility for environmental management has now been transferred from the Ministry of Agriculture to the new Ministry of Development, Planning and Production. This Ministry now has responsibility for national planning and is now responsible for the following agencies and statutory bodies:

- .1. Natural Resources Conservation Division
- .2. Urban Development Corporation
- .3. Scientific Research Council
- .4. Planning Institute of Jamaica
- .5. Town and Country Planning Authority.

The primary aim of this Ministry is to increase the level

of co-ordination for planning and environmental management.

In addition to the establishment of this new Ministry, efforts should also be made towards strengthening the organizational capabilities and co-ordinating mechanisms of the other existing institutions. In addition, the economic and sectorial agencies with which they interact, should integrate sustainable development objectives into their policies, programmes and budgets.

Presently, there are two pieces of legislation in the Chambers of the Chief Parliamentary Council. These legislations:

- 1) the Natural Resources Conservation Authority Bill and;

- 2) the Natural Resources Conservation Act

are being refined for Cabinet and Parliamentary approval.

The Natural Resources Conservation Bill is concerned with the establishment of the Natural Resources Conservation Authority as a Statutory Body. This Bill will incorporate the functions of previous Acts and Authorities amalgamated into one.

The Natural Resources Conservation Act is seeking to unite and update the laws relating to natural resources, and to create a single entity to deal with environmental matters.

The proposed authority will be charged with:

- a) increased co-ordination in environmental management.
- b) increased monitoring role inclusive of harsher penalties for violations of environmental regulations.

Legislation to incorporate global issues such as transboundary movement of toxic wastes, importation, regulation and control of chemicals reported to cause the depletion of the ozone layer, and the greenhouse effect will also be incorporated into the portfolio responsibility of the NRCA.

## 7.7 International Instruments

International marine treaties and conventions are legal instruments created to address international issues and to create international standards.

Some of these instruments are concerned with the preservation of marine resources and the protection of the marine environment. The newest convention dealing with the protection and preservation of the marine environment and the exploitation of living resources within national jurisdiction, and which Jamaica ratified in 1983 is the United Nations Convention on the Law of the Sea.

Article 194 states the necessity of taking pollution control and other measures to protect marine habitats and important ecosystem in all waters.

With regard to these various international conventions which deal directly or indirectly with coastal and marine matters, Jamaica has ratified the following Conventions:

- i) International Convention for Safety of Life at Sea (SOLAS) 1974 - October 10, 1983.
- ii) International Convention for Preventing Collision at Sea (COLREG) 1972 - March 30, 1979.
- iii) International Convention on Load Lines 1966 - August 18, 1982.
- iv) Standards of Training and Certification and Watchkeeping for Seafarers (STCW) 1978-February 19, 1987.
- v) International Convention on Maritime Search and Rescue 1979 - June 10, 1988.
- vi) United Nations Convention on the Law of the Sea 1982 - March 21, 1983. (not yet in force).

The following Conventions are being examined with a view to early accession:

- i) All pollution conventions.
- ii) International Convention on Tonnage Measurement of Ships 1969.
- iii) International Conventions for Safe Containers (CSC) 1972.
- iv) International Convention on the Facilitation of Maritime Traffic 1965.

### 7.8 Regional Conventions

A co-ordinated effort to protect the marine environment of the Wider Caribbean has been established through the development of a Regional Agreement - Convention for the Protection and Development of the Wider Caribbean. This Convention was signed in Cartagena in March 1983.

The Convention requires the Caribbean States to "take all appropriate measures to reduce, control or prevent pollution and to ensure sound environmental management of natural resources".

The Convention outlines the sources of pollution requiring control - pollution from ships, dumping, landbased sources and sea bed activities together with air borne pollution.

The Convention also identifies environmental management issues for which co-operative efforts are to be made usually with regard to protected areas, co-operation in cases of emergency, environmental impact assessment and technical co-operation.

Another legal agreement adopted for the protection and development of the Wider Caribbean is the "Protocol Concerning Co-operation in Combating Oil Spills in the Wider Caribbean". Jamaica ratified both Convention and Protocol in March 1983.

An Action Plan for the Caribbean has also been established under the UN Regional Seas Programme. This Caribbean Action Plan (CAP) represents an initiative but complex approach to marine environmental problems.

The Caribbean Action Plan (CAP) was adopted by 22 Carib-

bean States and territories in Montego Bay, Jamaica. This plan grew out of the concern by the Caribbean Countries for the protection, conservation and development of the marine and coastal resources of the region.

The CAP is concerned with the marine environment, land-based pollution (industrial and domestic) fisheries, protection of habitat and protection of species that are either endangered or close to being so.

The preparatory phase of the CAP was held in Montego Bay, Jamaica, on April 8, 1981 and Jamaica was also chosen as the site of the headquarters for the co-ordinating unit of the Action Plan.

The need for regional co-operation is very clear, especially since activities in one country may affect the environment of other countries within the region.

Development in most of the Caribbean Countries has taken place along the coast, thereby increasing the potential threats and hazards to the coastal resources and the marine environment of the region. The largest industrial complex in the region can be found in the coastal areas of Venezuela, Columbia, Mexico, Cuba, Gulf of the United States, Puerto Rico, Trinidad and Tobago, the Netherlands Antilles, US Virgin Islands and Jamaica. <sup>1</sup>

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<sup>1</sup> Thacher, Peter S. & Meith, Nikki. The Caribbean Example. United Nations Environment Programme. Ocean Yearbook 3, University of Chicago Press, 1982.

These development trends carry risks of increased pollution of the Wider Caribbean waters and, as a result threaten the delicate coastal and marine ecosystems upon which most of the biological productivity of the region depend.

### 7.9 Summary and Conclusion

Despite the plethora of legislations and the multiplicity of agencies dealing with marine and coastal questions, environmental management has been retarded due to the following:

- i). absence of comprehensive national environmental legislation;
- ii) absence of effective enforcement measures;
- iii) institutional weaknesses as a result of problems of shortage of financial and technical resources;
- iv) low level of public awareness of environmental matters;
- v) lack of a national policy for environmental education;
- vi) poor co-ordination and cooperation among agencies and other institutions having some aspects of environmental functions;
- vii) lack of environmental planning and coordination on a national level; and



viii) over-centralisation of decision making.

Plans are now being put in place to correct and resolve some of these problems. One initiative is the establishment of a new Ministry to integrate environmental management.

The process of ratifying international conventions should be increased and the continued active participation in regional conventions should be enhanced.

Chapter 8 briefly outlines the importance of integrating marine policy into national development and the elements that are required for the successful implementation and enforcement of such a policy.

## CHAPTER 8

# INTEGRATING MARINE POLICY INTO JAMAICA'S NATIONAL DEVELOPMENT STRATEGIES

### 8.1 Introduction

As it moves into the 1990's Jamaica will continue to depend on its natural resource base to sustain and advanced its programme of economic growth.

Presently, Jamaica faces many environmental problems caused by land-based activities, such as industrial development, urbanisation and ocean based activities such as shipping, port operations and fishing. Marine related activity such as tourism development has also contributed to the problems. The environmental problems which include polluted harbours and rivers, destruction of marine and coastal habitat, increasing destruction of mangrove forests and depletion of marine renewable resources such as fisheries have occurred due to the type and pattern of development that has been pursued over the years.

~~Development of various sectors~~, including the marine sector, has been done on a sectorial basis with very little regard to the impact on the environment. This stems from the fact that policy makers and planners were not aware of the intricate link between the environment and development. An analysis of this type of development has shown that sectorial planning creates conflicts among sectors and also contributes to the degradation of the natural resources and the environment on which development depends.

The environment is very important as it provides both the

basis for, and the limits to economic development. Development process is therefore likely to be short lived in the absence of general concern for and specific attention to environmental issues.

✓ In order to halt the environmental problems, new strategies for the continued exploitation within sustainable limits need to be established. The strategies should be so devised, that the objectives of environmental conservation are harmonised and integrated with the programme of economic development. Environmental protection is essential for continued development over the long period.

## 8.2 Sustainable Development of the Coastal and Marine Resources

Economic development involves the utilization of natural resources both from land and from the sea. The marine resources are important natural resources of the island, which will continue to play an important role in attaining some of the economic and social objectives of the island. However, if utilization of these resources is to continue in the present and be available in the future, the integrated management system to be established must be effective.

The concept of sustainable development has been promulgated by a number of international funding agencies such as The World Bank, UNDP, and USAID, and has been defined by the World Commission on Environment and Development as;

"Development that meets the needs of the present without compromising the ability of future gene-

rations to meet their own needs "

(World Commission on Environment and Development)

Implicit in the above definition is the concept of integrated planning and management.

V Sustainable development of the marine and coastal resources will therefore require a comprehensive plan of action which should consist of long term goals supported by well defined policies and objectives. These policies and objectives should be a part of the government overall national development plan.

Addressing and balancing the multiple conflicting uses of the marine and coastal resources, planning their rational utilization as well as their protection and restoration for present and future economic and social need, should be part of the objective for achieving sustainable development.

### 8.3 National Development and the Marine Sector

The marine sector as shown in Chapter 2 makes significant contribution to the economic development of the country. This sector will continue to play an important role in meeting some of the key developmental objectives of the island such as income and employment generation.

The marine sector has also contributed to the degradation of the resource base of the island. In order to reverse the environmental problems and to continue to benefit from the sector, the sector must be fully incorporated into the government's national development process.

#### 8.4 Environmental Assessment and Project Evaluation

Environmental Assessment is concerned with assessing and evaluating environmental problems and their impact on the island. Consequently, every major development project whether it concerns economic infrastructure, industrial development, tourism development and resource development should be reviewed in terms of its impact on the environment.

An environmental review and assessment system need to be established to deal with the problems of development and environmental degradation. This system will allow the government to be aware of the potential and immediate long term effects of the development projects it approves, as well as the measures necessary to mitigate these effects.

An Environmental Assessment Review Department should be created within the proposed Natural Resources Conservation Authority. This review department should develop guidelines for the preparation, and review of the EIA statements. Peter Bartlemus in his book entitled "Environment and Development" indicates that an EIA statement should contain important information such as:

- .1 a description of the proposed action and alternative;
- .2 a prediction of the nature and magnitude of the environmental effects (both positive and negative);
- .3 a listing of impact indicators as well as methods used to determine their scale of magnitude and relative weight;

- .4 a prediction of the magnitude of the impact and indicator and of the total impact for the project and for alternatives;
- .5 recommendations for the acceptance or rejection of the projects; and
- .6 recommendations for inspection procedures.

All environmental impact assessment review should have the public's participation. This is because projects proposed for development may not only damage the physical environment, but they may have effect upon other aspects that touch upon the mental as well as physical wellbeing of people. Also, public participation in the review helps to ensure that the broadest spread of interest is considered in the decision making process.

#### **8.5 Training, Education and Public Awareness**

Environmental education is very important and is a key element towards the integration and consolidation of the actions required for sustainable development.

The importance of environmental education as a means of improving the quality of life was recognised at the 1972 Stockholm Conference on the Environment. The Intergovernmental Conference on Environmental Education in Tbilisi, USSR in October 14-16 1977 organised by UNESCO in co-operation with UNEP reinforces the initiatives that had been adopted by government following the Stockholm Conference.

The lack of environmental education and public awareness on environmental issues and matters in Jamaica has con-

tributed to the present environmental problems. Consequently, there is presently a great need for environmental training, education and public information throughout the country in general.

This can be implemented through the school system, the mass media, NGO's, research institutions and private organisations. NGO's like the Jamaica Junior Naturalist, National History Society, etc, have been playing a key role in disseminating information on environmental issues. These bodies should be encouraged and their capabilities strengthened, so that they may continue to play an active role in environmental education and public awareness. These bodies should also be encouraged to work together so as to avoid the duplication of activities and waste of resources. Other organisations and agencies which are involved in environmental education should also be integrated into the system.

Public awareness and environmental education are very important, in that, they can promote an awareness and understanding of the the environment, its problems and the effects of human action on the environment. This will also serve to reduce and eradicate some of the illegal practices such as dynamiting fish, which are detrimental to the marine resources and the environment.

Environmental education in Jamaica will firstly involve the development of a national policy on environmental education. This policy should be geared towards increasing public awareness of the value and importance of the Jamaican coastal resources, the environment, and the need for proper management of these resources.

The policy formulation and implementation can only be

successfully achieved if planners, policy makers, managers and directors of private organisation and the general public are aware of the value and importance of the islands ecosystem and coastal resources.

Programmes should therefore be developed to raise the consciousness of the following actors, of the importance of the environment:

- .1 policy makers
- .2 industrial developers and planners
- .3 tourists
- .4 fishermen
- .5 farmers
- .6 hoteliers
- .7 recreational users
- .9 coastal communities

Educational programmes should also be developed at the primary, secondary and higher education levels.

The private sector should also be encouraged to start taking responsibilities and actions necessary to preserve and promote a sustainable environment, while still achieving for the enterprise and in general for the economy, profitability, growth and survival.

There is also a great need to increase the number of technically trained specialised personnel in marine and coastal affairs. Training can be undertaken at the World Maritime University in Malmo, Sweden, Caribbean Academic Institutions and Dalhousie University of Canada.

Fellowship for training can be sought from ICOD, The Dal-



housie University in Canada, the Commonwealth Secretariat and other funding agencies.

### 8.6 Regional Cooperation

A regional approach to solving environmental problems is very rewarding and beneficial. Jamaica can solve some of the environmental problems by sharing experiences on common problems and by pooling of limited resources. For example in the area of research, the marine laboratories available in the Caribbean can be utilized for the collection and dissemination of information within the region. Regional Co-operation can also be enhanced by technology transfer and also by comparing solutions and results.

The Law of the Sea Convention also recommends regional co-operation in certain aspects. The Convention calls for regional co-operation in formulating and implementing conservation and mangement strategies for the living marine resources, including co-operation in exchange of scientific information, the conservation and development of stock and the optimum use of highly migratory species.

A UNEP Regional Seas Programme for the Caribbean has been establised to address many of the environmental problems of the Wider Caribbean. Some of the programmes and projects to be implemented under this Regional Seas Programme (The Caribbean Action Plan) can be adopted by Jamaica. Jamaica can also share and learn from the experiences of other countries within the region.

### 8.7 International Assistance

The successful implementation of the national integrated

marine policy will also depend on international assistance. Financial and technical assistance can be sought from a number of regional and international institutions such as the OAS, CIDA, UNDP, ICOD, The World Bank, IMO, FAO, UNEP, ILO and other agencies.

A number of these agencies such as CIDA, UNDP, and ICOD are presently funding and implementing projects in Jamaica which are related to environmental management.

### **8.8 Summary and Conclusion**

Having looked at the major issues relating to the development and management of the coastal and marine resources, the development and control of the coastal areas, the conclusion reached is that the present system of environmental management has to be changed. This is absolutely necessary, if resources are to be available for future use. The sustainable development of the coastal and marine resources should be one of the main objective to be included in the future national development plan of the government. Sustainable development of resources requires the development of policies and plans.

The final chapter on policy and programme recommendations provides recommended policies and objectives necessary for the new management strategies of coastal and marine resources. Programmes and options are also outlined, and prioritised.

## CHAPTER 9

### POLICY AND PROGRAMME RECOMMENDATIONS

#### 9.1 Introduction

The coastal and marine resources and the natural systems of which they are a part have contributed significantly to the wellbeing of the Jamaican Economy. These resources will continue to make their contribution, but to a lesser extent, if these resources and the natural systems are not exploited and maintained within sustainable limits.

The development and management of these resources cannot be separated from the development and management of the coastal area because of their close link and interaction. The coastal and marine environment and bordering coastal land supports a variety of economic activities such as industries, tourism, transportation and communication, agriculture, port and shipping, fisheries and coastal communities some of which rely on the coastal resources. For example, tourism relies on the beautiful beaches and clean waters.

With the establishment of an EEZ, Jamaica has the opportunity to expand and intensify the development of the coastal and marine resources. This will however require a new approach to the development and management of the existing uses and the potential for the development of new uses. The new strategy recommended in this paper is in the form of a holistic approach to resource use.

This Chapter will outline policies and programmes/options and priority actions that are necessary for the sustain-

nable development of the coastal area and the coastal and marine resources. These policies should not be developed on a sectorial basis but should be integrated into the government's national economic development plan. The first part of the chapter outlines:

- the objectives of a national integrated marine policy;
- the programmes/options required for achieving these objectives; and
- priority actions and possible projects for implementation.

The second part of the chapter will:

- establish policy recommendations for the marine sector;
- outline the priority areas within the marine sector for development; and
- develop programmes for the development of the sector.

## 9.2 Policy and Programme Recommendations

### 9.2.1 National Integrated Marine Policy.

It should be the aim of the government to effectively manage and conserve the coastal and marine resources towards contributing optimally to sustainable national development. This utilization should be within a compre-

hensive integrated legal and administrative framework.

.1. Economic Objectives:

- .1. To increase employment and income opportunities;
- .2. To increase production and availability;
- .3. To accelerate economic and social development; and
- .4. To increase foreign exchange earnings.

.2. Development and Management Objectives:

- .1. To manage coastal and marine resources use and related activities so as to preserve development options for future generations;
- .2. To protect the marine and coastal ecosystem from population pressure and economic development;
- .3. To integrate marine and coastal development plans into the government's macro policy;
- .4. To develop and manage coastal and marine resources within sustainable limits;
- .5. To improve common property resource management;
- .6. To protect and preserve the natural resources and the environment so as to ensure that such resources yield the greatest benefits to the present generation without losing the potential to meet the needs and ambitions of the future generation;

- .7. To increase government foreign exchange reserves by promoting activities such as offshore oil exploration.
- .8. To increase the contribution of renewable resources to national development.

#### 9.2.2 Priority Programmes/Options and Objectives

**Strengthening the Scientific, Technical Management and Administrative Capabilities of Ministries, Agencies, and other Institutions having Environmental Responsibilities**

##### Objectives

- To provide ministries and institutions having environmental responsibilities with the required and necessary equipment such as patrol boats, human and financial resources to perform their duties and functions effectively and efficiently.
- To conduct marine and coastal resource inventories and environmental assessment, types and effects of pollution, formulate improved management approaches, enforce regulations and monitor development.
- To ensure effective implementation and monitoring of projects and programmes.

The Establishment of a Mechanism for Co-ordination and Co-operation among Government Agencies and other Organisations.

#### Objectives

- To minimise the duplications and overlapping of jurisdictions and functions.
- To ensure that scarce financial, physical and human resources are applied efficiently and effectively.
- To facilitate the integration of different policies and cross connections among different agencies responsible for separate implementation.
- To have effective co-ordination among research institutions.
- To have effective co-ordination and co-operation among government agencies, and between government agencies and non-governmental organisations and the private sector.

Training of Technicians and Personnel in Different Areas in the Marine Field.

#### Objectives

- To reduce the dependence on foreign personnel.
- To effectively develop and implement policy objectives.
- To effectively enforce environmental legislations and

guidelines.

- To develop and co-ordinate environmental education programmes.

### **The Establishment of a Comprehensive National Marine Legislation.**

#### **Objectives**

- To reduce the overlapping and duplications in legislations.
- To make the existing laws and legislations more effective and enforceable.
- To incorporate the development of the resources of the EEZ into the legislative system.

### **The Establishment of a National Policy For Environmental Education.**

#### **Objectives**

- To inform the public and to increase public awareness on the importance of sustainable development of the marine and coastal resources and the need to protect such resources.
- To increase the effective management of the coastal and marine resources and to protect the marine environment.
- To educate policy makers, planners and developers of the intricate link between development and the environ-



ment.

- To integrate environmental education into the academic institutions starting at the primary school level.

### **The Establishment of a Comprehensive Information System**

#### **Objectives**

- To contribute to better decision making.
- To establish a permanent system for the exchange of managerial and technical information.
- To provide information on the existing and potential conflicts and complementarity among the marine sector and other areas.
- To create a better understanding of the interaction between the marine ecosystem and the impact on this system by certain activities.
- To analyse more effectively water discharge from industries to coastal areas so that enforceable and implementable regulations can be developed.

### **The Establishment of a System to Integrate, Co-ordinate, Regulate, and Monitor the Activities of Various Users of the Coastal Areas and the Coastal and Marine Resources.**

#### **Objectives**

- To minimise the conflicts amongst users of the coastal

- areas, and the coastal and marine resources;
- To allow for the harmonisation of marine activities within the coastal areas and the marine environment.
- To conduct a social and environmental impact assessment of all marine sector developmental activities.
- To protect the coastal and marine resources and the marine environment.

**The Establishment of Regulations to Manage and Regulate Industrial Development and Ensure That Such Development Supports Sustainable Development of Coastal and Marine Resources.**

#### **Objectives**

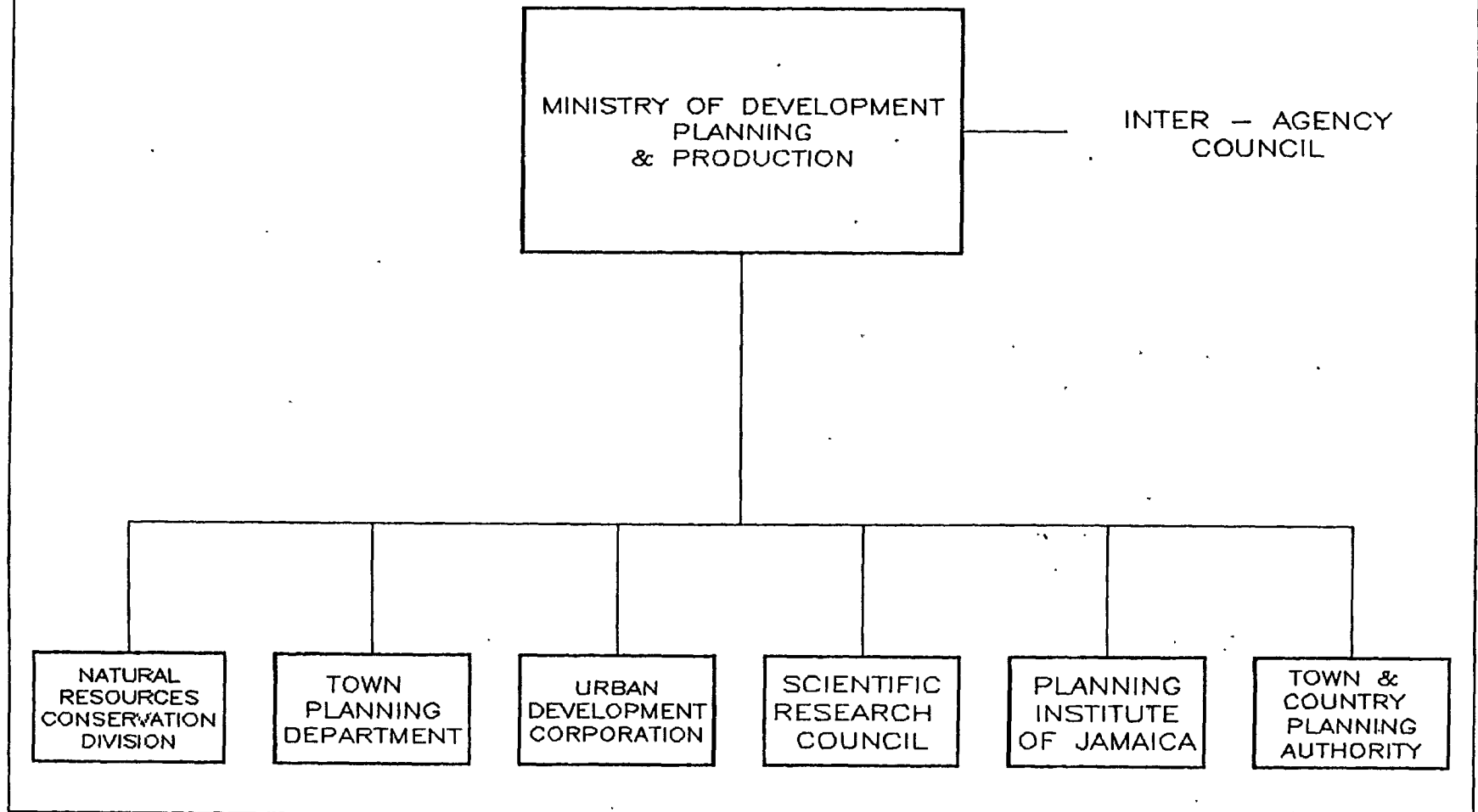
- To protect marine and coastal resources and the environment by training, equipping and supporting adequate numbers of government personnel to regulate, and monitor the discharge of industrial sewage into inland and coastal water bodies.

#### **9.2.3 Institutional Structure**

The Ministry of Development, Planning and Production was established in Mid 1989. The Ministry now has overall responsibility for national planning and environmental management. One of the objectives of the new ministry is to increase the level of co-ordination for planning and environmental management. (See chart 3)

CHART 3

# CO-ORDINATED APPROACH TO ENVIRONMENTAL MANAGEMENT



.1.Functions of the Ministry of Development, Planning and Production should be:

- To act as a permanent interface with all government agencies and departments having some aspects of marine and coastal affairs.
- To co-ordinate all activities of the various ministries (see chart 3) agencies, research institutions and non-governmental organisations dealing with marine and coastal matters.
- To analyse environmental problems and to make recommendations for solution of the problems. This could be undertaken by an Advisory Unit within the Ministry.
- To liaise with the media, so that the public is aware of the activities within the marine sector.
- To integrate all coastal and marine matters in the national economic and physical planning of the country.

.2. Establishment of An Inter-Agency Council

An Inter- Agency Council should be established within the Ministry of Development, Planning and Production with representatives from: (see chart 3)

- a) Natural Resources Conservation Division
- b) Town planning Department
- c) Urban Development Corporation

- d) Scientific Research Council
- e) Planning Institutions of Jamaica
- f) University of the West Indies
- g) Ministry of Finance
- h) Ministry of Agriculture
- i) Port Authority
- j) Non-governmental Organisations
- k) Fisheries Industry.
- l) Tourism Industry
- m) Private Sector Organisation.

*2*.3. Function of the Agency should be: .

To review and co-ordinate all coastal and marine development plans, as well as developmental activities that impact on the resources and the marine environment. This would include activities such as resource development, port development, agricultural development, tourism development, fisheries development, and industrial development that has an impact on the marine environment.

#### .4. Functions of Proposed Natural Resources Conservation Authority. (see chart A)

- To be responsible for co-ordinating information and maintaining an inventory of natural resources.
- To prepare guidelines of Environmental Impact Assessment Statements, to review such statements and to provide recommendations where necessary.
- To co-ordinate environmental education programmes.
- To co-ordinate and monitor development of the marine and coastal resources. .
- To co-ordinate and monitor the review and updating of environmental legislation.

The Fisheries Division of the Ministry of Agriculture and the Environmental Control Division of the Ministry of Health should be put under the Proposed Natural Resources Conservation Authority.

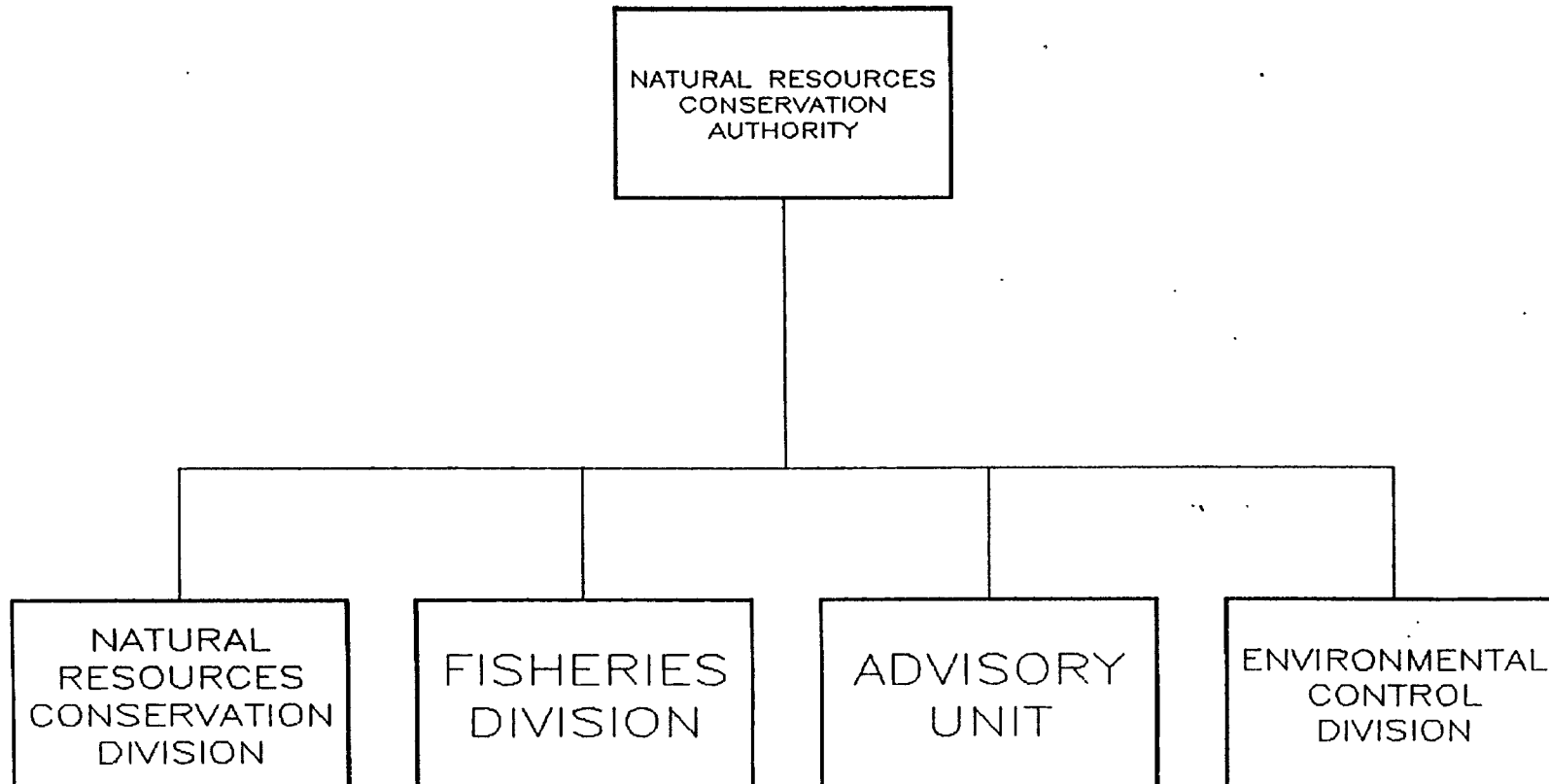
#### 9.2.4 Policy Recommendations For the Marine Sector

##### Priority Areas

- .1. Tourism
- .2. Port and Shipping
- .3. Fisheries
- .4. Offshore Oil and Gas Exploration

CHART 4

## ORGANISATIONAL CHART



## .1. Tourism

### Policy

Tourism contribution to economic development should be maintained, but must be managed at a pace which is compatible with existing social and cultural systems and which preserves the environmental resources of the country.

### Objectives

- To increase foreign exchange earnings and employment.
- To integrate tourism into the comprehensive development and land - use planning.
- To protect and preserve the natural resources of the island.
- To reduce the negative social and cultural impact of tourism.
- To coordinate the planning of tourism development with other coastal zone activities to ensure sustainable development.
- To involve local authorities and the community in coastal site analysis to determine suitable locations for tourism development.



### Priority Programmes

#### The Establishment of a System for the Protection and Conservation of the Coastal and Marine Resources and the Marine Environment

- Develop a mechanism for project review and environmental impact assessment of all tourism development projects.
- Update the Beach Control Act to make the public and commercial beaches safer and more pleasant to tourists and nationals.
- Develop regulations to control operators providing aquatic sporting facilities at beaches.
- Control the siting of hotels and other tourist accommodations.
- Develop and enforce regulations pertaining to the discharge of sewage from hotels and other tourists into inland and coastal waters.
- Monitor and restrict sand dredging, groyne construction and reef blasting.

#### Training, Education and Public Awareness

- Increase the awareness of private tourism developers of the importance of the close relationship between tourism development and the environment.
- Establish a public tourism information awareness pro-

gramme to inform tourists and nationals of the environment and the activities causing destruction to the environment.

#### Information and Data

- Establish a tourism data base to enhance planning and management capabilities.
- Establish a mechanism for the effective coordination of government and statutory bodies and private sector organisations dealing with tourism and tourism related activities.
- Improve expertise in tourism data collection.
- Explore opportunities for local community involvement in tourism activities.

#### Port and Shipping

##### Policy

To increase the contribution of ports and shipping to the economic development of the island, while ensuring the conservation and protection of the marine and coastal resources and the marine environment.

##### Objectives

- To increase the foreign exchange earnings of the country.

- To integrate port planning in the national economic planning system.
- To improve the facilities and services offered by the ports.

### Priority Programmes

#### **The Development of Pollution Control and Contingency Planning Programmes**

- Establish a communication system for detecting, locating and reporting oil spills.
- Identify relatively safe chemical oil dispersants and effective oil containment and removal equipment.
- Establish an institutional and operational system for contingency plan implementation.

#### **The Development of Surveillance and Enforcement Measures to Protect the Marine Environment from Pollution from Ships.**

- Establish a regional co-operation system for the pooling of resources to purchase patrol boats and vessels.
- Establish a co-ordination system with law enforcement personnel of the country such as Police, Coast Guard and the Jamaica Defence Force.
- Establish a system for utilising fishermen in surveillance.

## Fisheries

### Marine Fisheries Policy

To promote, develop and manage (conserve) the fisheries of the island so as to enable the industry to make meaningful contribution towards the short and long run economic development of the island and to promote diversification

### Objectives

- To promote the development of the fishing industry so as to:
  - a) increase export and reduce import of fisheries products;
  - b) to increase the income and livelihood of fishermen; and
  - c) to increase the contribution of fisheries to domestic protein supply.
- To promote the development of non - traditional uses of fish and to encourage the development of a fisheries subsector.
- To rebuild and maintain the fish stock.
- To enhance yield and the continued sustainability of fish resources through improved fisheries management and supervision.

- To modernise the fishing industry through the:
  - a) improvement of fishing infrastructure; and
  - b) the provision of modern vessels and gears.
- To improve the educational standards and skills of the fishing population so as to enable them to take full advantage of the modernisation and expansion of the fishing industry.
- To promote fisheries research for the utilization of unexploited species.
- To promote aquaculture in order to reduce over-exploitation of marine fisheries.
- To liaise with bi-lateral and mult-lateral donor agencies which are able to provide funding, expertise and equipment necessary for fisheries development.
- To coordinate the interest of the regulatory body and those of the fishermen such that that the interests of both parties can co-exist.
- To encourage the development of fisheries co-ops.
- To develop a zonal area and a fishery calendar.
- To develop a mechanism for the coordination among agencies such as UWI, SRC, Fisheries Division, NRCD and ECD in respect of research.

## Priority Programmes

### The Preservation and Protection of the Fisheries Resources and the Marine Habitat

- Close the over-exploited fishing areas to rebuild stock and to provide alternative employment to fishermen (aquaculture)

### The Strengthening and Upgrading of the Fisheries Division

- To effectively implement and enforce fisheries policies and fisheries management programmes.
- To collect required information and data.
- To maintain data on the volume and value of landing and production.
- To keep a good inventory of the number of fishermen and their vessels and the costs of earnings of their enterprises.

### The Assessment of Fisheries Resources

- Determine the maximum economic yield and the maximum sustainable yield. This will assist in the implementation of quotas.

### Education, Training and Public Awareness

- educate local fishermen to adopt biologically sound fishing techniques.

### **Policy Formulation**

- Formulate fisheries habitat and conservation policy.

### **Introduction of New Technology**

- Introduction of modernised vessels and fishing gears.

### **Control of Fishing Activities and Efforts**

- Imposition of a licensing system.
- Gear limitation.
- Development of protected areas.
- Reduction of fishing time.
- Seasonal closure of fishing areas.

### **The Provision of Infrastructure**

- Develop facilities for landing, storage, and stowage of gear, and maintenance of engine and equipment.
- Establish fishing centers and cooperatives for marketing and distributing.

## Offshore Oil and Gas Exploration

### Policy

To increase government foreign exchange reserves by promoting the exploration and development of offshore oil and gas resources in a manner that ensures protection and preservation of the coastal resources and the marine environment.

### Objectives

- to explore new fields
- to reduce the country's dependence on oil import.

### Programmes and Options

The Establishment of Sound Institutional and Operational Systems for Plan Implementation

The Establishment of Guidelines to Regulate Exploration and Drilling Activities and Transportation and Refinery

#### 9.2.5 Summary and Conclusion

The policies and programmes outlined above do not represent a comprehensive list of policies and programmes for the utilization of coastal and marine resources within sustainable development, but represents some very important policies that could be adopted by the government.



## CONCLUSION

With a population of over 2 million dependent on the limited natural resource base of the island, and with the potential of additional benefits and responsibilities to be gained by the extension of the national boundary in accordance with UNCLOS there is a great need to develop new management strategies for the sustainable development of the natural resources. This is because over the years, these resources and the marine environment have been subjected to economic and social pressures resulting in destruction and degradation of the marine environment.

A new strategy is also required to minimise the existing and potential conflicts among users of the coastal and marine resources.

As shown in this study, the marine sector which contributes significantly to the economic development of the country depends on the coastal and the marine environment. However these sectors are destroying the resources which are vital to their existence. Therefore, the marine and coastal resources and the natural ecosystems of which they are apart must be managed for the long term because of their strategic economic importance to the future welfare and prosperity of the country.

The present sectorial approach to coastal and marine resources development cannot continue if the resources are to be available for the future. Consequently, future planning and management for the country's coastal zone and coastal and marine resources should be done on a comprehensive and holistic basis and should be integrated into the national development strategy of the country. This will allow for the development of potential resour-

ces of the Exclusive Economic Zone within sustainable limits and the prevention of irreversible damage to natural resources. This approach will firstly require the establishment of a cohesive marine policy.

As indicated in a World Bank report:

" sound environmental management ... is critical for sustained economic growth and should be an integral part of economic policy-making at all levels of government... This will require a rethinking of the importance of resources management and environmental issues in many developing countries and assignment of responsibility and the development of analytical and policy-making capacity in both line ministries and central agencies. It will also require substantial external assistance and greater collaboration in development community" <sup>1</sup>

The establishment of a integrated national marine policy with well defined goals and objectives and which should be incorporated into the macro economic development policy of the country will stimulate the sustainable development of the island's limited resources and fragile ecosystems.

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<sup>1</sup> World Bank Staff Report 1987.

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## ANNEX A

### ENVIRONMENTALLY RELATED MARINE - LEGISLATIONS

#### 1. The Beach Control Act (1978)

The Beach Control Act established the Beach Control Authority and vested in the Crown the foreshore, the floor of the sea and overlying water, and prohibits the use of both in connection with any commercial enterprise without a license obtained from the Resources Conservation Division of the NRCD. The Resources Conservation Division is also empowered to declare protected areas and prohibits activities such as fishing, waste disposal, dredging and coral reef removal from such protected areas. The RCD approves all plans for the development of beaches, inspects beaches to ensure adherence to BCA prescribed safety and cleanliness standards and enforces regulations pertaining to declared protected areas.

The Beach Control Act Regulation 1978 relates to hotels, commercial and public recreational beaches, regulate beach activities and care of beaches and outline the rights of license.

#### 2. The Wildlife Protection Act (1964)

Under this Act, the use of dynamite or explosives, poison or noxious material to kill or injure fish is prohibited. It provides power for the conservation of wildlife. The Act also prohibits the removal, sale or possession of turtle eggs, and immature or juvenile fish. The Act prohibits the discharge of trade effluent or industrial waste from any factory into harbours, lagoons, estuaries and streams.



### **3. The Petroleum Act 1979**

The Petroleum Act gives the Petroleum Corporation of Jamaica the authority to explore and develop petroleum resources without creating adverse effects on the marine environment.

### **4. The Town and Country Planning Act (1958)**

Under this Act, the Town and Country Planning Authority is responsible for the control and development of land in both rural and urban areas. TCPA is responsible for ratifying Development Orders containing broad base land use plans and regulations to ensure that development is carried out in a rational manner.

### **5. The Local Improvement Act**

This Act established the Local Planning Authority which is responsible for the approval of all plans for the subdivision of land for building, leasing, sale and other purposes.

### **6. The Urban Development Act (1968)**

The Urban Development Co-operation established under this Act has authority to acquire, manage and dispose of land within designated areas, and to act as the sole planning authority within the designated areas.

### **7. The Morant and Pedro Cays Act (1907)**

This Act prohibits unauthorised fishing, and the slaying or capture of birds, turtle and removal of turtle eggs without a license from the Morant and Pedro Cays.

### **8. The Fishing Industry Act (1975)**

This Act provides for the licensing and registration of all fishermen and vessels operating in Jamaican waters.

The Act also deals with the protection and conservation of fish stock of Jamaican waters by establishing closed seasons. It also provides for the creation of fish sanctuaries and penalties for landing and sale of illegally caught fish.

#### **9. The Harbour Act 1874**

The Harbour Act prohibits the discharge of rubbish, earthstone, ballast, mud, oil, mixture with oil or its residue in any harbour or in any ship channels. It also prohibits the removal of stones and gravels from reefs, shoal or cays of Port Royal and other cays. Also, under this Act, the Port Authority has power to declare harbours and establish boundaries of harbours.

#### **10. The Port Authority Act (1972)**

The Marine Division of the Port Authority regulates, and approves the construction of structure on or over the waters.

#### **11. The National Heritage Act**

The Act which is administered by the National Heritage Trust provides for the protection of habitat for certain wildlife species

#### **12. The Watershed Protection Act (1963)**

The Watershed Protection Act provides for the designation of watershed for conservation purposes. The Act which is administered primarily by the Natural Resources Conservation Division is intended to reduce soil erosion, ensure a regular flow in rivers and streams, maintain optimum levels of ground water and encourage proper land use. All 33 watersheds have been designated protected areas under this act.

### **13. The Quarries Act (1955-1958)**

This Act covers all work done in getting stone, sand, marl, gravel or clay. The Act covers inspection of quarry works and enforcement of regulations designed to promote safety and to protect the environment. Standards for the various types of materials mined are also set and regulated through the Act.

### **14. The Marine Board Act (1985)**

This act requires licensing of all motorised vessels and operators of such and designates recreational areas along the coastline and types of activity allowed in these areas.

## ANNEX B

# MINISTRIES, AGENCIES AND INSTITUTIONS WITH FUNCTIONS RELATED TO ENVIRONMENTAL MANAGEMENT.

### Key Regulatory and Management Agencies

Natural Resources Conservation Division (NRCD). NRCD, in the M. of Agriculture, is Jamaica's chief resource management and conservation agency. NRCD administers several pieces of key environmental legislation, including the Beach Control Act (1955), the Wildlife Protection Act (1945), and the Watershed Protection Act (1963). NRCD's functions include:

- Resource management and policy formulation for wildlife species, watersheds and coastal zone management;
- Research and monitoring of inland and nearshore aquatic resources, including surveys and investigations on water quality, aquatic ecology and nearshore physical dynamics;
- Planning and development of national parks, both marine and terrestrial, as well as the conservation and protection of unique natural areas;
- Development control, including the performances of environmental impact assessment; and
- Execution of a Public Education Programme aimed at increasing public awareness for all areas of environmental management.

Environmental Control Division (ECD). The ECD, in the M. of Health, seeks to develop and ensure the application of environmental standards and appropriate technology geared towards the protection of public health, livestock, crops, and natural resources. It also carries out monitoring and assessments with regard to the control of water quality, sewage, industrial wastewater, solid waste, industrial working environments, air pollution and noise.

Town Planning Department (TPD). The role of TPD, which is within the M. of Finance and Planning, is to carry out comprehensive and balanced development of land throughout the island along the national/regional and urban development policy guidelines of the Government. Inherent in these functions is the vital role of development control with respect to the orderly and progressive development of cities, towns and their necessary amenities, as well as education of the public regarding the role of the planning process as a critical aspect of community life. The Town Planning Department is represented on the Town and Country Planning Authority. The TPD is responsible

for: preparation of the National Physical Plan; recommendations for public policies on land use and development; preparation of land use studies, plans, and regulations; preparation of Development Orders; coordination of interagency review of subdivision applications; and the preparation of development suitability maps and studies.

### Key Economic Planning and Investment Agencies

Planning Institute of Jamaica (PIOJ). The PIOJ initiates and coordinates planning for the economic, financial, social, cultural and physical development of the country, monitors the implementation of these plans, and manages technical cooperation, agreements and programmes. In addition, the PIOJ carries out research, training and provides consultant services to government ministries, agencies and statutory bodies.

Urban Development Corporation (UDC). The UDC, a statutory corporation reporting to the M. of Finance and Planning, is legally empowered, within designated UDC areas, to act as its own planning authority and to design and construct development projects and to implement conservation elements of its projects. UDC also prepares physical plans for designated areas, and supervises and coordinates implementation of the Comprehensive Rural Townships Development Plan.

Petroleum Corporation of Jamaica (PCJ). The PCJ, a statutory body established under the Petroleum Act (1979), reports to the M. of Mining, Energy and Tourism. PCJ is empowered to conduct a broad range of activities for the development of the country's energy resources. PCJ's operations include petroleum exploration, operation of the Petrojam Refinery, and investigation of the potential uses of Jamaica's peat resources.

Jamaica National Investment Promotion, Ltd. (JNIP). The JNIP, along with the Jamaica National Investment Co. Ltd. (JNIC), is a statutory corporation reporting to the M. of Finance and Planning. JNIP and JNIC provide local or foreign private investors with advice, information and assistance regarding investment opportunities.

Jamaica Industrial Development Corporation (JIDC). JIDC, a statutory body under the M. of Industry and Commerce, is the principal agency charged with ensuring that the GOJ's industrial development objectives are fulfilled.

## **Supporting Investment and Development Agencies**

Energy Division. The Energy Division, within the M. of Mining, Energy and Tourism, is responsible for the development and monitoring of a National Energy Policy and the gathering and analysis of information in regard to petroleum products and energy conservation.

Jamaica Public Service Co. (JPSCo.). JPSCo is responsible for developing and maintaining the country's public electricity distribution network.

Ministry of Construction (Works) The Works Division of the M. Construction has a principal role in constructing and repairing flood and erosion control facilities and other public facilities and infrastructure (e.g., roads and bridges). The Works Division also reviews large private development proposals for conformance with construction standards.

National Water Commission (NWC). The NWC is responsible for water supply and most of the sewerage works in the Kingston/St. Andrew corporate area.

Jamaica Bauxite Institute (JBI). The JBI, a limited liability company, is involved in the research and development of bauxite reserves and bauxite conversion processes, allocation of mining sites, establishment of bauxite levies, and monitoring the safety of mining operations, alumina production, and reclamation of mined lands.

AGRO-21 Corp. Ltd. Agro-21 is a statutory body, jointly funded by the Government of Jamaica and USAID. Its primary objective is to restructure the country's agriculture by employing improved technology and a programme of crop diversification. Under this programme, private investors have been encouraged to become involved in development of non-traditional export crops.

Agricultural Development Corp. (ADC). The ADC is a statutory body under the M. of Agriculture whose purpose is to improve and/or maintain the quality of Jamaica's produce, particularly livestock production.

Forest Industry Development Co. (FIDCO). FIDCO is responsible for all commercial forestry activities, establishment and maintenance of forestry plantations, and logging, transport and processing of harvested timber. FIDCO is accountable to both the Ministry of Finance

and the Ministry of Agriculture.

Coffee Industry Development Co. (CIDCO). CIDCO is responsible for establishment and maintenance of major coffee plantations.

Jamaica National Export Corporation (JNEC). The JNEC is responsible for development, promotion and expansion of Jamaica's non-traditional export products.

Ministry of Mining, Energy & Tourism (MMET). The MMET is responsible for the formulation and implementation of Government policies relating to mineral resource development and mining and energy management and for the overall development of tourism, including policy formulation, promotion, marketing and all other aspects of the tourism industry.

Jamaica Tourist Board. The Jamaica Tourist Board, a statutory organization, is responsible for promoting tourism locally and overseas and for developing and maintaining tourism industry standards. Two subdivisions of the Jamaica Board are the Jamaica Attractions Development Co. (JADCo), which is charged with developing new sites and attractions for tourism and enhancing existing sites, and the Rafting Authority which is responsible for the development and regulation of river rafting.

## **OTHER INSTITUTIONS**

A number of private voluntary organizations (PVO's) and research institutions also play a role in environmental management. These include:

Institute of Jamaica. The Institute of Jamaica was established to encourage and develop knowledge in the areas of literature, science, arts, culture and history, and the conservation of monuments for the public benefit. This is accomplished via the delivery of lectures, the compilation and publication of literature of historical, scientific or artistic interest and the establishment and maintenance of schools, museums, galleries, halls and other places reserved for the dissemination and development of literature, science and the arts.

Scientific Research Council (SRC). The SRC, a statutory body within the M. of Agriculture, was established in 1960. Its role is to foster and coordinate scientific research and to encourage the application of such research to the exploitation and development of the island's

JIDC plans for and implements public sector industrial projects, promotes both public and private industrial development projects, and operates industrial estates throughout the island. Recently merged with the National Industrial Development Company, the "new" JIDC is responsible for the development and implementation of a Comprehensive National Industrial Plan and is specifically responsible for upgrading the performance of the manufacturing sector.

#### **Supporting Resource Management and Protection Agencies**

Fisheries Division. The Fisheries Division of the M. of Agriculture is responsible for promoting fisheries development through research, administration of fisheries laws, training and credit services to fishermen, and monitoring of offshore fishery reserves.

Inland Fisheries Unit (IFU). The IFU, within the M. of Agriculture, is responsible for maintaining an islandwide programme to encourage small farmers to take up fish farming. IFU's programme concentrates on extension, production, training, research, and marketing coordination.

Port Authority of Jamaica. The Port Authority regulates coastal structures on or over water, provides aids to navigation, monitors oil spills, provides information on ship traffic, and is responsible for the review, approval, construction and leasing of buildings on the foreshore in areas under its jurisdiction.

Mines and Quarries Division (MQD). The MQD, within the M. of Mining, Energy, and Tourism, collects and disseminates information on the geological resource base of the country, for example, geological mapping to identify mineral deposits, potential geological hazards, assessment of slope stability, drainage and other physical factors in reviewing development and subdivision applications. The MQD also provides technical assistance in matters relating to prospecting, mining and quarrying.

Office of Disaster Preparedness (ODP). ODP, within the M. of Construction, coordinates disaster response and post-disaster recovery activities, makes recommendations on public policies for the avoidance of risk areas, maintains a system for monitoring and forecasting environmental events, and reviews development and subdivision proposals in high risk areas.

Water Resources Division (WRD). The WRD of the M. of Local Government collects data and provides technical information and support to other GOJ agencies on water resources (e.g., streamflow and tidal data, critical water levels, etc.)

Underground Water Authority (UWA). The UWA is a statutory body which was established under the Underground Water Authority Act (1962) to provide for the conservation and proper use of underground water resources and to control the exploitation of such resources. To this end, the UWA is empowered to issue licences for groundwater extraction.

Watershed Engineering Division (WED). The WED, part of NRCO, is involved in water conservation through the implementation of various watershed management projects (e.g., for the reduction of soil erosion, river bank stabilization, etc.).

Meteorological Office. The Met Office of the M. of Public Utilities and Transport provides technical support to other agencies through the collection of data on weather (rainfall, winds, etc.) and issues warnings of severe weather conditions.

Survey Department. The Survey Dept. of the M. of Agriculture prepares, updates, and maintains a central depository of islandwide maps (including topographic maps) and aerial photos.

Forest Department. The Forest Department of the M. of Agriculture is responsible for non-commercial forestry activities, extension, planning and research, training, and administration. The Forest Department leases forest reserve lands to FIDCO for commercial forestry operations.

Metropolitan Parks and Market Company (MPM Co.). MPM Co., an affiliate of the UDC, is responsible for administration of metropolitan parks and refuse collection in the Kingston Metropolitan Area.

Bureau of Standards. The Bureau of Standards administers legislation and regulations related to the establishment and enforcement of uniform standards: the Standards Act (1968); the Processed Food Act (1959); and the Weights and Measures Act (1976). The Bureau makes recommendations with respect to the formulation and application of standards and specifications and provides for the examination and testing of commodities and processes.